



## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                                                                           |                                                          |                                                                                                                                                                        |                                     |                                                                                                                      |            |     |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Technical electrochemistry, PG_00058345                                                                                                                                                                                                                                                                                                                                   |                                                          |                                                                                                                                                                        |                                     |                                                                                                                      |            |     |
| Field of study                              | Hydrogen Technologies and Electromobility                                                                                                                                                                                                                                                                                                                                 |                                                          |                                                                                                                                                                        |                                     |                                                                                                                      |            |     |
| Date of commencement of studies             | October 2025                                                                                                                                                                                                                                                                                                                                                              |                                                          | Academic year of realisation of subject                                                                                                                                |                                     | 2026/2027                                                                                                            |            |     |
| 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                               | 2                                                                                                                                                                                                                                                                                                                                                                         |                                                          | Language of instruction                                                                                                                                                |                                     | Polish                                                                                                               |            |     |
| Semester of study                           | 3                                                                                                                                                                                                                                                                                                                                                                         |                                                          | ECTS credits                                                                                                                                                           |                                     | 4.0                                                                                                                  |            |     |
| Learning profile                            | general academic profile                                                                                                                                                                                                                                                                                                                                                  |                                                          | Assessment form                                                                                                                                                        |                                     | assessment                                                                                                           |            |     |
| Conducting unit                             | Department of Corrosion and Electrochemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology                                                                                                                                                                                                                                                      |                                                          |                                                                                                                                                                        |                                     |                                                                                                                      |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                                                                                        |                                                          | dr hab. inż. Paweł Ślepski                                                                                                                                             |                                     |                                                                                                                      |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                                                                                                  |                                                          | dr hab. inż. Paweł Ślepski                                                                                                                                             |                                     |                                                                                                                      |            |     |
| 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 addresses:<br>Moodle ID: 1864 ELEKTROCHEMIA TECHNICZNA<br><a href="https://enauczanie.pg.edu.pl/2025/course/view.php?id=1864">https://enauczanie.pg.edu.pl/2025/course/view.php?id=1864</a>                                                                                                                                                             |                                                          |                                                                                                                                                                        |                                     |                                                                                                                      |            |     |
| 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                                                       |                                                                                                                                                                        | 7.0                                 |                                                                                                                      | 48.0       | 100 |
| Subject objectives                          | The aim of the course is for the student to master the knowledge of applications of electrochemical methods in industry. In addition, the student will master the ability to independently carry out electrochemical processes and analyses with industrial applications on a laboratory scale.                                                                           |                                                          |                                                                                                                                                                        |                                     |                                                                                                                      |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                                                                                                                                                                                                            |                                                          | Subject outcome                                                                                                                                                        |                                     | Method of verification                                                                                               |            |     |
|                                             | [K6_U13] can use properly selected methods and devices enabling the measurement of basic quantities characterizing materials and technological processes                                                                                                                                                                                                                  |                                                          | Controls selected technical electrochemical processes.                                                                                                                 |                                     | [SU2] Assessment of ability to analyse information<br>[SU4] Assessment of ability to use methods and tools           |            |     |
|                                             | [K6_W02] has knowledge of physics and chemistry including electrostatics, electromagnetism, electrodynamics, wave motion, acoustics, mechanics, thermodynamics, optics, solid state physics; including knowledge necessary to understand the basic physical phenomena occurring in hydrogen devices, systems and installations as well as automation and robotics systems |                                                          | The student is familiar with and understands the fundamental electrochemical phenomena and laws, as well as their significance in industrial electrochemical processes |                                     | [SW3] Assessment of knowledge contained in written work and projects                                                 |            |     |

|                                                                |                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                 |                               |
|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Subject contents                                               | Course content – lecture<br><br>Application of electrochemistry in corrosion monitoring and protection: electrochemical monitoring of corrosion rates, cathodic and anodic protection of metallic industrial structures. Electrochemical application of metallic coatings. Electrochemical wastewater treatment: electrocoagulation, electro-oxidation of organic compounds. |                                                                                                                                                                                                                                                 |                               |
|                                                                | Course content – laboratory<br><br>Monitoring of corrosion rate by polarisation resistance method. Analysis of potentiodynamic curves to determine corrosion rate and type of control. Anodic and cathodic protection of metallic materials. Application of anodic and cathodic metallic coatings. Study of the effectiveness of the electrocoagulation process.             |                                                                                                                                                                                                                                                 |                               |
| Prerequisites and co-requisites                                | The student has a basic knowledge of the mathematics of physics and the fundamentals of electrochemistry. The student has the ability to perform laboratory experiments in electrochemistry.                                                                                                                                                                                 |                                                                                                                                                                                                                                                 |                               |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                     | Passing threshold                                                                                                                                                                                                                               | Percentage of the final grade |
|                                                                | report                                                                                                                                                                                                                                                                                                                                                                       | 100.0%                                                                                                                                                                                                                                          | 40.0%                         |
|                                                                | written exam                                                                                                                                                                                                                                                                                                                                                                 | 60.0%                                                                                                                                                                                                                                           | 60.0%                         |
|                                                                |                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                 |                               |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                             | K. Jackowska, P. Kryszewski; Applied Electrochemistry, De Gruyter, 2020<br><br>R. Dylewski, W. Gnot, M. Gonet; Elektrochemia przemysłowa, WPS, Gliwice 1999.<br><br>H. Bala; Korozja materiałów - teoria i praktyka, WIPMiFS, Częstochowa 2000. |                               |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                     | journal: "Journal of Applied Electrochemistry", Springer                                                                                                                                                                                        |                               |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                 |                               |
|                                                                |                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                 |                               |
| Example issues/<br>example questions/<br>tasks being completed | <ul style="list-style-type: none"><li>• electrochemical protection of steel in a sulphuric acid environment</li><li>• metallization - acid baths</li><li>• electro-oxidation of paracetamol</li></ul>                                                                                                                                                                        |                                                                                                                                                                                                                                                 |                               |
| Practical activities within the subject                        | Not applicable                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                 |                               |

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