COURSE DESCRIPTION CARD - SYLLABUS

Course name
Designing of the electrochemical processes [S2TCh2-ES>PPE]

Course

Field of study
Chemical Technology

Year/Semester
2/3

Area of study (specialization)
Applied Electrochemistry

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
30

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

The student has a basic knowledge of chemistry, physics and mathematics acquired from the first degree of study in the fields of chemical technology, environmental protection technologies, chemical and process engineering, pharmaceutical engineering or other related fields. The student should be able to implement self-education. The student should understand the need for further self-learning (further education).

Course objective

The aim of the course is to master students' principles of designing technological processes in the field of electrochemical engineering using various types of electrolysers and galvanic cells in terms of ensuring the set technological and economic parameters such as efficiency, the degree of reacting reactants, unit energy consumption or their optimization.

Course-related learning outcomes

Knowledge:
1. Has expanded and in-depth knowledge in the field of electrochemistry and other related areas of science, allowing to formulate and solve complex tasks related to electrochemical technology. [K_W2]
2. Has knowledge of complex electrochemical processes, including the appropriate selection of

materials, raw materials, methods, techniques, apparatus and equipment for the implementation of electrochemical processes and characterization of the obtained products. [K_W3]
3. Has extended knowledge of advanced devices and apparatus used in electrochemical technology. [K_W13]

Skills:
1. Has the ability to obtain and critically evaluate information from literature, databases and other sources, and formulate opinions and reports on this basis. [K_U1]
2. Has the ability to communicate with specialists and non-specialists in the field of electrochemical technology and related fields. [K_U4]
3. Is able to independently determine the directions of further education and implement self-education. [K_U5]
4. Has the ability to professionally present research results in the form of a report or presentation. [K_U6]
5. Has extended skills to analyze and solve problems related to electrochemical technology, using theoretical, experimental and simulation methods for this purpose. [K_U10]
6. Is able to properly verify the concepts of engineering solutions in relation to the state of the art in electrochemical technology and electrochemical engineering. [K_U11]
7. Has the ability to adapt knowledge in the field of electrochemistry and related to solve problems in the field of electrochemical technology and planning new industrial processes. [K_U12]
8. Is able to properly formulate and verify hypotheses related to engineering problems in electrochemical technology. [K_U14]
9. Is able to critically analyze industrial electrochemical processes and introduce modifications and improvements in this area, using the acquired knowledge, including knowledge about the latest achievements of science and technology. [K_U15]
10. Is able to critically assess the practical usefulness of using new achievements in electrochemical technology. [K_U17]
11. Has the skills necessary to work in an industrial environment and in research teams. [K_U18]
12. Knows and obeys the safety rules related to the performed work. [K_U19]
13. Has the ability to use the knowledge acquired under the specialty course in professional activity. [K_U23]
14. Is able to design a complex device or process in the field of electrochemical technology and electrochemical engineering. [K_U24]

Social competences:
1. Is aware of the need for lifelong learning and professional development. [K_K1]
2. Is aware of the limitations of science and technology related to electrochemical technology, including environmental protection. [K_K2]
3. Professionally recognizes problems and makes the right choices related to the profession, in accordance with the principles of ethics. [K_K3]
4. Adheres to all teamwork rules; is aware of the responsibility for joint ventures and achievements in professional work. [K_K4]
5. Represents a high moral level in relation to social and professional problems. [K_K5]
6. Can think and act in a creative way. [K_K6]
7. Understands the need to provide the public with information on the current state and directions of development of electrochemical technology, on the principles of use and handling of products of electrochemical processes, about the risks associated with the acquisition and distribution of raw materials in the electrochemical industry. [K_K7]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Written test of theoretical base and calculating skills.
2. Assessment of group-carried out projects presenting given electrochemical processes.

Programme content

Issues concerning principles of designing technological processes in the field
of electrochemical engineering using various types of electrolysers and galvanic cells in terms of ensuring the set technological and economic parameters such as efficiency, the degree of reacting reactants, unit

energy consumption or their optimization.

Course topics

Design classes include the transfer of knowledge in the field of electrochemical engineering necessary in the design of electrolytic technological processes for the treatment of post-production sewage, desalination of water as well as selected electroplating processes to optimize parameters such as efficiency, energy efficiency, time-space efficiency and unitary energy consumption.

Teaching methods

1. Practical methods (subject exercises).

Bibliography

Basic:
1. A. Ciszewski, Podstawy inżynierii elektrochemicznej, Wydawnictwo Politechniki Poznańskiej, Poznań 2004.
2. A.Ciszewski, Technologia chemiczna, procesy elektrochemiczne, Wydawnictwo Politechniki Poznańskiej, Poznań 2008.
3. R. Dylewski, W. Gnot, M. Gonet, Elektrochemia przemysłowa. Wybrane procesy i zagadnienia, Wydawnictwo Politechniki Śląskiej, Gliwice 1999.
4. M. Gonet, R. Dylewski, Elektrochemia przemysłowa, Wyd. Politechniki Śląskiej, Gliwice 2002.
5. A. Kisza, Elektrochemia. Tom I: Jonika, WNT, Warszawa 2000.
6. A. Kisza, Elektrochemia. Tom II: Elektrodyka, WNT, Warszawa 2000.

Additional:
1. W. Rekść, Elektrochemia techniczna, Wydawnictwo Politechniki Poznańskiej, Poznań 1990.
2. A. Czerwiński, Akumulatory, bateria, ogniwa, WKŁ, Warszawa 2005.
3. H. Sholl, T. Błaszczyk, P. Krzyczmonik, Elektrochemia. Zarys teorii i praktyki, Wydawnictwo Uniwersytetu Łódzkiego, Łódź 1998.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00