COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of electrochemical technology

Course

Field of study
Circular System Technologies

Year/Semester
3/5

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	30	
Tutorials	Projects/seminars	

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
dr hab. Piotr Krawczyk, prof. PP

Responsible for the course/lecturer:

Prerequisites

Student has a ordered knowledge of mathematics, analytical chemistry and physical chemistry and he also has ability to use the basic techniques in a laboratory scale.

Course objective

The aim of the course is to familiarize students with an teoritical as well as practical aspects of technical electrochemistry and develop skills for the practical application of selected electrochemical processes according to the principles of circular systems technologies.

Course-related learning outcomes

Knowledge

1. Students has the theoretical knowledge in the field of inorganic, organic, physical and analytical chemistry - K_W04,

2. Students knows the principles of environmental protection associated with the chemical production and the management of raw materials, materials and waste in circular systems technologies - K_W06,

3. Has knowledge in the fields of techniques, methods of identification and characterization of main and by-products in circular systems technologies - K_W11.

Skills

1. He plans, selects equipment and scientific apparatus, carries out investigations, interprets the results and makes conclusions based on this - K_U03,

2. Correctly uses nomenclature and terminology in the field of circular systems technologies, chemistry, technology and chemical engineering, environmental protection and related disciplines, also in a foreign language - K_U05,

3. Makes analyzes and verifies existing technical solutions in the field of a closed-cycle technologies - K_U11.

Social competences

1. Exhibits an independence and creativity in individual work, effectively cooperates in a team, playing various roles; objectively assesses the effects of his own work and that of team members - K_K02,

2. Objectively assesses the level of his knowledge and skills, understands the importance of improving professional and personal competences adequately to the changing social conditions and the progress of science - K_K05.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Rating of written answers within the subjects related to the theme of the practical classes.

Checking of current knowledge and practical skills, the ability to conduct experiments corectly during laboratory classes. Performing all laboratory exercises provided for the study program. Final mark of the laboratory class will correspond to the mean of the sum of the above.

In the case of on-line classes, the knowledge check will be carried out in the form of a test consisting of 3 - 5 questions for each exercise and report for the given experimental data.

The knowledge acquired during the lecture is verified by a written final exam in the subject consisting of 3 questions. Passing threshold will correspond to 51% of the maximum number of points.

In the case of on-line classes, the exam will take the form of a test consisting of 20 test questions and five open questions. Passing threshold: 51% of the maximum number of points.

Programme content

1. The principles of electrochemical processes.

2. Electrodes balances.

3. The mechanisms of electrode processes.

4. The kinetics of electrode processes.

5. Construction of electrochemical reactors and their influnce on the course of electrochemcial processes.

6. Technological processes in circular systems technologies.

7. The selected electrochemical processes used for synthesis of chemical compounds.

8. The selected electrochemical processes used for synthesis of electrode materials.

9. Electrochemical formation of galvanic coatings.

10. The selected electrochemical processes used for environmental protection.

11. The selected issues in the field of generation, conversion and storage of electrical energy.

12. The principles of electrochemical processes in chemical power sources.

13. Corrosion from the electrochemical point of view.

Teaching methods

Lecture, problem lecture, explanation, didactic discussion, classes, project method, laboratory exercises.

Bibliography

Basic

1. A. Kisza – Elektrochemia cz. I i II (Jonika i Elektrodyka) WNT, W-wa, 2001,

2. R. Dylewski, W. Gniot, M. Gonet, Elektrochemia przemysłowa, Wyd. Politechniki Śląskiej, 1999,

3. A. Czerwiński, “Ogniwa, akumulatory, baterie”, WNT, W-wa, 1999,

4. C. G. Zoski praca zb., Handbook of Electrochemistry, Elsevier, 2007,

5. A. Ciszewski, Technologia chemiczna. Procesy elektrochemiczne, Wyd. Politechniki Poznańskiej, 2008.

Additional

1. Ch. Comninelis, G. Chem, Electrochemistry for the Environment, Springer, 2010

2. A.V. da Rosa, Fundamentals of Renewable Energy Processes, Elsevier/Academic Press, 1990,

3. H. Scholl, T. Błaszczyk, P. Krzyczmonik, Elektrochemia, Wyd. Uniwersytetu Łódzkiego, 1998.

4. F. C. Moreira, R. A.R. Boaventura, E. Brillas, V. J.P. Vilar, Electrochemical advanced oxidation processes: A review on their application to synthetic and real wastewaters,Applied Catalysis B: Environmental 202 (2017) 217–261.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	63	2,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	37	1,5

[1] delete or add other activities as appropriate