COURSE DESCRIPTION CARD - SYLLABUS

Course name
Chemical power sources

Course

Field of study
Chemical Technology

Year/Semester
1/2

Area of study (specialization)
Technical electrochemistry

Profile of study
general academic

Level of study
Second-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	75	
Tutorials	Projects/seminars	

Number of credit points

8

Lecturers

Responsible for the course/lecturer:
dr inż. Tomasz Rozmanowski

Responsible for the course/lecturer:

Prerequisites

Has basic knowledge in the field of chemical and electrochemical technology, chemical engineering, electrical engineering and electronics, knows the principles of construction, operation and selection of devices, reactors used in electrochemical technology.

Student understands the need for continuous training and raising their professional and personal competences.

Course objective

Transfer of knowledge on the methods of direct conversion of chemical reaction energy into electricity, principles of construction and functioning of chemical power sources.

Course-related learning outcomes

Knowledge

1. Has knowledge of complex chemical processes, including relevant material selection, raw materials, methods, techniques, apparatus and equipment for implementation of chemical processes and the characterization of the obtained products - [K_W3]

2. Has well-established and extended knowledge of the selected specialty - [K_W11]

Skills

1. Is able to properly verify concepts of engineering solutions in relation to the state of knowledge in chemical technology and engineering - [K_U11]

2. Has the skills necessary to work in an industrial environment and in research teams - [K_U18]

3. Has the ability to use the knowledge acquired under the chossen specialty in professional work- [K_U23]

Social competences

1. Is aware of the need for lifelong learning and professional development - [K_K1]

2. Has formed awareness of the limitations of science and technology related to chemical technology, including environmental protection - [K_K2]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. The knowledge acquired during the lecture is verified by a 60-minute written exam consisting of 3 to 5 questions. The pass mark is 50% of all points. In the case of introducing the remote learning mode, the credit will take the form of a test posted on the e-Kursy platform. The test will contain 10 to 20 single and multiple choice questions, open-ended questions, and true-false questions.

2. The skills acquired during the laboratory classes are verified on the basis of written tests. In the case of introducing the remote teaching mode, the credit will take the form of a test posted on the e-Kursy platform or on the basis of an oral test using e-meting platform.

Programme content

1. Thermodynamic equilibria of electrode substances and electrolytes.

2. Primary cells with aqueous and non-aqueous electrolytes.

3. Acid and alkaline batteries.

4. Power sources with high specific energy and long cyclic life; lithium-ion and hydride batteries.

5. Fuel cells.

6. Electrochemical capacitors.

7. Electrochemical cells with non-metallic electrodes.

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the blackboard.

Laboratory classes: multimedia presentation illustrated with examples given on a blackboard and performance of tasks given by the teacher - practical classes.

Bibliography

Basic

1. A. Czerwiński, Ogniwa, akumulatory, baterie, Wydawnictwa Komunikacji i Łączności, Warszawa 2012.

2. C. Vincent, B. Scrosati, Modern Batteries: An Introduction to Electrochemical Power Sources, Butterworth Heinemann, Oxford 1997.

Additional

1. A. Ciszewski , Podstawy inżynierii elektrochemicznej, Wydawnictwo Politechniki Poznańskiej, Poznań 2004.

2. J. Gomółka, F. Kowalczyk, A. Franke, Współczesne chemiczne źródła prądu, Wydawnictwo Ministerstwa Obrony Narodowej, Warszawa 1977.

Breakdown of average student's workload

	Hours	ECTS
Total workload	200	8,0
Classes requiring direct contact with the teacher	120	4,8
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam) [1]	80	3.2

[1] delete or add other activities as appropriate