COURSE DESCRIPTION CARD - SYLLABUS

Course name
Recycling in electromobility [S2Elmob1>RwE]

Course

Field of study
Electromobility

Year/Semester
2/3

Area of study (specialization)
Energy Processing Systems

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
15

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

dr hab. Małgorzata Osińska
malgorzata.osinska@put.poznan.pl

Lecturers

Prerequisites

The student has the necessary knowledge of chemistry to understand chemical phenomena and processes. The student knows the basic information about the construction and construction of chemical energy sources. The student understands the need for continuous training and improving their professional and personal competences.

Course objective

Obtaining knowledge about the principles and assumptions of recycling in electromobility, i.e. the production of a safe product using modern, economical methods, while protecting the natural environment.

Course-related learning outcomes

Knowledge:
Has general knowledge of environmental protection problems related to the implementation of selected chemical processes used in the recycling of materials and substances used in electromobility and the use of alternative fuels [K2_W09]
Has knowledge of development trends, new achievements in the field of electromobility and dilemmas of modern civilization, especially in terms of the impact of changes in the ways of powering vehicles on

the natural environment [K2_W10]

Skills:
Can estimate the costs of design, production, operation and disposal of electric systems and devices of hybrid and electric vehicles, including traction vehicles [K2_U08]
Can, when formulating and solving engineering tasks, take into account unpredictable conditions, the given technical specification and non-technical criteria, ensuring savings of raw materials and energy as well as security of IT systems of electric vehicles [K2_U11]

Social competences:
Understands that in the area of technology knowledge and skills are rapidly devaluing, which requires their constant supplementation [K2_K01]
Is aware of the importance of the latest scientific and technical achievements in solving research and practical problems and, if necessary, supporting expert opinions [K2_K02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lecture is verified by a written test consisting of several dozen test questions and/or several open questions. Passing threshold: 51% of the maximum sum of points.
In the case of online classes, the credit will take the form of an online test consisting of several test questions. Passing threshold: 51% of the maximum sum of points.

Programme content

Environmental protection standards and regulations and measures taken to prevent environmental pollution. Technological possibilities of reducing the amount of waste, recycling, methods used for the recovery of materials (e.g. from the electric motor, wiring, electronic components). The global market for chemical power sources and the possibilities of their recycling. Recycling methods used on a technical scale-problems and directions of development. Circular economy in electromobility, i.e. reducing the dependency on primary raw materials and minimizing the environmental impact of electric vehicles production.

Teaching methods

Lecture: multimedia presentations containing drawings, diagrams, photos, supplemented with practical examples on the board, slides and computer programs, which makes it easier to combine theory with practice. Lecture supplemented with additional materials provided to students for independent study. Using students' knowledge from other subjects, initiating discussions, asking questions in order to increase student activity and independence.

Bibliography

Basic:
1. J. Kijeński, A. Błędzki, R. Jeziórska, Odzysk i recykling materiałów polimerowych, Wyd. Naukowe PWN, Warszawa 2020.
2. J. Krystek, Ochrona środowiska dla inżynierów, Wydawnictwo Naukowe PWN, Warszawa 2018.
3. J. Jabłoński (red),Technologie „zero emisji”, Wydawnictwo Politechniki Poznańskiej 2011.
4. B.Bartkiewicz, K. Umiejewska, Oczyszczanie ścieków przemysłowych, Wyd. Naukowe PWN, Warszawa 2020.

Additional:
1. R. Dylewski, metody elektrochemiczne w inżynierii środowiska, Wydawnictwo Politechniki Śląskiej, Gliwice 2000.
2. Act of 24 April 2009 on batteries and accumulators
http://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU20090790666/U/D20090666Lj.pdf
http://www.gios.gov.pl/images/dokumenty/gospodarka_odpadami/baterie/wytyczne_techniczne_baterie_i_akumulatory.pdf

Breakdown of average student's workload

	Hours	ECTS
Total workload	28	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	13	0,50