COURSE DESCRIPTION CARD - SYLLABUS

Course name
Materials in electric vehicles [S1MiTPM1>MwPE]

Course

Field of study
Materials and technologies for automotive industry

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

A student entering this course should have a basic knowledge of physics and chemistry as well as materials science with a special focus on materials for electric vehicless. He or she should also have the ability to obtain information from the indicated sources and have a willingness to cooperate as part of a team.

Course objective

To provide students with knowledge about the materials used in electric vehicles with particular emphasis on their classification and basic characteristics divided into application areas including materials for the construction of chassis and running gear, materials for power transmission and charging components, materials for power supply components, construction and types of cell designs used in automotive applications, technological aspects of manufacturing traction cells and the problems of regeneration and recycling of materials used in electric vehicles.

Course-related learning outcomes

Knowledge:
1. Has a structured knowledge of physics, chemistry and electrochemistry, the structure of matter,

necessary to understand the basic physical and chemical phenomena occurring in materials used in electric vehicles.
2. Has a basic knowledge of electrical and electronic engineering, including DC and AC devices, semiconductor and electronic circuits and instruments with a focus on materials used in electric vehicles.

Skills:
1. Can communicate and formulate engineering problems using a variety of techniques in a professional environment, selecting appropriate information and quality management systems. Is able to use information and communication techniques appropriate to the implementation of tasks typical of engineering activities, including organizing work in a team.
2. The student is able to prepare well-documented problems in automotive materials engineering and technology, in particular on the selection of materials, manufacturing technology, methods of testing materials used in electric vehicles.
3. The student is able to apply methods of materials testing and operate specialized measuring apparatus.

Social competences:
1. The student understands the importance of knowledge in the field of materials used in electric vehicles and is aware of its impact on the possible purchasing or technological decision-making process, and thus on the formulation and communication of content related to the subject matter in a commonly understood manner.
2. Is able to appropriately determine priorities for the realization of a task or project defined by him/herself or others, and consistently carries them out.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired in the lecture is verified by a credit in the form of a test. The test consists of 20-35 questions (open and closed), variously scored. The threshold for passing: 50% of the points. The credit issues on the basis of which the questions are developed are presented at the lectures and discussed in detail during the lectures.

Programme content

Topics discussed at the lectures include: materials used in electric vehicles utility introduction, materials for the construction of bodies and running gear, materials for drive and charging components, materials for power components, construction and types of cell construction used in automotive applications, technological aspects of manufacturing traction cells, problems of regeneration and recycling of materials used in electric vehicles.
For the design part, the topics include: Discussion of issues for the realization of the project task related to the presentation of the application of materials in electric vehicles and individual realization of application presentations of materials in electric vehicle applications.

Course topics

Lecture
1. Materials used in electric vehicles utility introduction
2 Materials for body structures and running gear assemblies
3 Materials for propulsion and charging subassemblies
4 Materials for power components
5 Construction and types of cell designs used in automotive applications
6 Technological aspects of manufacturing traction cells
7 Problems of regeneration and recycling of materials used in electric vehicles
Project
1 Discussion of issues for the implementation of the project task related to the presentation of the application of materials in electric vehicles.
2 Individual realization of presentation in rang of materials in electric vehicle applications.

Teaching methods

Multimedia presentation, on-line lecture

Bibliography

Basic:
1. Dobrzański L. Podstawy nauki o materiałach i metaloznawstwo. WTN, Warszawa, 200
2. BUDOWA POJAZDÓW ELEKTRYCZNYCH Cz. I - Podręcznik Cz. II - Studia przypadków, Autor: Arkadiusz Małek,ISBN - wersja elektroniczna: 978-83-66159-97-66
3.Electric Vehicles: Modern Technologies and Trends, edited by Nil Patel, Akash Kumar Bhoi, Sanjeevikumar Padmanaban, Jens Bo Holm-Nielsen, ISBN:9789811592515, 9811592519, Published:November 25, 2020, Publisher:Springer Nature Singapore
4. Batteries for Electric Vehicles Materials and Electrochemistry By Helena Berg 2015,ISBN:9781107085930,Published:August 20, 2015,Publisher:Cambridge University Press
5.Advances in Battery Technologies for Electric Vehicles 2015, ISBN:9781782423980, Published:May 25, 2015, Publisher:Elsevier Science
6.Electric and Hybrid Vehicles By Tom Denton • 2016, Published:2016, ISBN: 9781315731612, Publisher:Routledge

Additional:
1. Materiały inżynierskie tom. 1 i 2, Ashby M.F., Jones D.R.H., WNT, 2004.

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