



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electric and hybrid vehicles

### Course

Field of study

Electrical engineering

Area of study (specialization)

Electrical Systems in Industry and Vehicles

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

Polish

Requirements

elective

### Number of hours

Lecture

0

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

### Number of credit points

1

### Lecturers

Responsible for the course/lecturer:

Ph.D., D.Sc. Leszek Kasprzyk, prof. of PUT

Responsible for the course/lecturer:

Institute of Electrical Engineering and  
Electronics

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### Prerequisites

Basic knowledge of the basics of electrical engineering, electrical machines and electricity storage. The ability to interpret the transmitted messages and effective education in the field related to electric and hybrid vehicles.

### Course objective

Acquainting students with popular groups and solutions of electric and hybrid vehicles. Presentation of the latest trends in the field of automotive. Overview of currently used electricity storage in motor vehicles

### Course-related learning outcomes

Knowledge



1. has ordered knowledge of the drive systems used in electric and hybrid vehicles, taking into account their impact on the environment
2. has knowledge about the energy consumption of motor vehicles, the application of identification rules, the use of software for the analysis of computer simulation results
3. has knowledge of designing simple drive systems

#### Skills

1. can develop detailed documentation of the results of an experiment, design or research task, can prepare a study containing a discussion of these results
2. is able to use the known methods and mathematical models, modifying them if necessary, for the analysis of electrical systems

#### Social competences

1. can think in a creative and entrepreneurial way

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The skills acquired during the project classes are verified on the basis of the evaluation of the current knowledge and the implemented projects. Passing threshold: 50% of points.

#### Programme content

History of motor vehicles, current statistics on transport and automotive in the world. Types of drives used in hybrid vehicles. Electricity storage facilities used in motor vehicles. The issue of energy consumption of motor vehicles. Parameters of popular electric and hybrid cars.

#### Teaching methods

Multimedia presentation, illustrated with examples given on the board, initiating discussions during the classes. Additional materials are placed in the eCourses system

#### Bibliography

##### Basic

1. Herner A., Riehl H. J.: Elektrotechnika i elektronika w pojazdach samochodowych; WKiŁ, Warszawa 2003.
2. Praca zbiorowa: Mikroelektronika w pojazdach. Informator techniczny BOSCH, WKiŁ, Warszawa 2002.
3. Jastrzębska G.: Odnawialne źródła energii i pojazdy proekologiczne, WNT, Warszawa 2009.

##### Additional

1. Denton T.: Automobile electrical and electronic systems, Arnold, London 2000.
2. Larminie J., Lowry J.: Electric vehicle technology. Explained, Wiley, West Sussex 2003



3. Kasprzyk L. Modelling and analysis of dynamic states of the lead-acid batteries in electric vehicles. *Eksploracja i Niezawodność – Maintenance and Reliability* 2017; 19 (2): 229–236

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	29	1,0
Classes requiring direct contact with the teacher	15	0,5
Student's own work (studies, preparation of the final project) <sup>1</sup>	14	0,5

<sup>1</sup> delete or add other activities as appropriate