STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Hybrid and electrc vehicle**		Code **1010315431010320020**	
Field of study **Power Engineering**	Profile of study (general academic, practical) **(brak)**		Year /Semester **2 / 3**
Elective path/specialty **Sustainable Development of Power**	Subject offered in: **Polish**		Course (compulsory, elective) **elective**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **part-time**		

No. of hours				No. of credits
Lecture: **9** Classes: **-** Laboratory: **-** Project/seminars: **-**				**1**

Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**

Education areas and fields of science and art
 	
technical sciences
    Technical sciences
	ECTS distribution (number and %**)**
	
	1 100%
	    1 100%

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge of the basics of electrical engineering, electrical machines and electric energy storage.
2	**Skills**	The ability to interpret the messages delivered and effective training in a field related to electric vehicles and hybrid.
3	**Social competencies**	It is aware of the need for further learning.

Assumptions and objectives of the course:

To acquaint students with popular groups and solutions electric and hybrid vehicles. Presentation of the latest trends in the automotive field. Discussion of the currently used electrical energy storage in vehicles.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. has ordered knowledge in the field of drive systems for use in hybrid and electric vehicles, taking into account their impact on the environment - [K_W07+]

2. knowledgeable about the energy consumption of vehicles, application of the principles of identification, using software to analyze the results of computer simulation - [K_W19+]

Skills:

1. Can develop a detailed documentation of the results of the experiment, the design task, or research, is able to prepare the development of a discussion of these results - [K_U08+]

2. able to use known methods and mathematical models, if necessary, modifying them, to analyze the technical and economic - [K_U14+]

Social competencies:

1. He able to think in a creative and enterprising - [K_K01+]

2. identifies and resolves dilemmas related to ecology, economy and energy security - [K_K02++]

Assessment methods of study outcomes

- evaluation of knowledge of current solutions in the field of hybrid vehicles,

- evaluation test.

Course description

History of motor vehicles, the current statistics on the transportation and automotive industries in the world. Types of motors used in hybrid vehicles. Electrical energy storage used in motor vehicles. The issue of energy consumption of vehicles. The parameters of popular electric and hybrid cars.

Update 2017:

TESLA electric vehicle.

Applied methods of education:

Lectures - with multimedia presentations (drawings, photographs, animations) supplemented by examples given on the board, run in an interactive way, with questions to students or specific students, presenting a new topic preceded by a reminder of related content known to students from other subjects

Basic bibliography:

1. Jastrzębska G.: Odnawialne źródła energii i pojazdy proekologiczne, WNT, Warszawa 2009

2. Bogumił Fic, Samochody elektryczne, Wydawnictwo i Handel Książkamim KaBe, 2015

3. Marek Brzeżański i Zdzisław Juda, Napędy hybrydowe, ogniwa paliwowe i paliwa alternatywne, Wydawnictwa Komunikacji i Łączności, 2010

Additional bibliography:

1. Larminie J., Lowry J.: Electric vehicle technology. Explained, Wiley, West Sussex 2003

2. Kasprzyk L. Modelling and analysis of dynamic states of the lead-acid batteries in electric vehicles. Eksploatacja i Niezawodnosc ? Maintenance and Reliability 2017; 19 (2): 229?236, http://dx.doi.org/10.17531/ein.2017.2.10

Result of average student's workload	

Activity	Time (working hours)
1. participation in lecture	15
2. consultation	4
3. preparation for a test	10

Student's workload		

Source of workload	hours	ECTS
Total workload	23	1
Contact hours	13	1
Practical activities	0	0