GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00053440		
Field of study	Electrical Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	4	Language of instruction	Polish
Semester of study	7	ECTS credits	8.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department Of Electrified Transportation -> Faculty Of Electrical And Control Engineering -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Leszek Jarzębowicz	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	15.0	0.0	0.0	60

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	60	10.0	130.0	200

Subject objectives

The aim of the course is to acquire knowledge in selected issues of electromobility. The student will learn about the construction and operation of electric and hybrid vehicles, as well as the elements of infrastructure that enable the operation of these vehicles.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W10	He/she lists the factors influencing the total energy consumption of an electric car.	[SW1] Assessment of factual knowledge
K6_U09	He/she selects the power and torque of the electric drive to obtain the appropriate maximum speed and initial acceleration.	[SU1] Assessment of task fulfilment
K6_U10	He/she designs a research scenario for the energy consumption of a hybrid or electric car to determine the factors influencing its energy consumption.	[SU1] Assessment of task fulfilment
K6_K01	He/she finds sources of information on selected aspects of the implementation of laboratory exercises.	[SK2] Assessment of progress of work

Subject contents

LECTURES: Traction electric drives. Energy consumption of electric vehicles. Hybrid electric cars. Electric cars charging. Electromechanical equipment of electric and hybrid motor vehicles. Electric energy storage devices.Construction and diagnostics of ignition and injection systems. Ecological aspects of automotive development. Vehicle traction control systems. Land transport infrastructure, standard and high-speed railway lines. Categories and types of roads, construction and elements of infrastructure, road junctions and intersections. Intermodal transport, transport containerization, transhipment infrastructure. Urban transport infrastructure, categories of streets, routing of tram lines, auxiliary infrastructure, metro and city rail lines, unconventional types of urban transport.

EXCERCISES: Vehicle movement. Electrical and energy calculations. Vehicle storage power supply. Passage simulation.

LABORATORIES: Traction control of a multi-motor electric vehicle. Speed profile shaping. Energy consumption analysis of a train. ABS of an electric vehicle. Energy consumption analysis of a car. Mobile robot.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">Accomplihed course of "Electrical engineering in transport".</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Lecture - tests</td><td>60.0%</td><td>40.0%</td></tr>
<tr><td>Laboratory - raports and preparation</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>Excercises - final test</td><td>60.0%</td><td>30.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Dentom T.: Automobile Electrical and Electronic Systems. Taylor & Francis, 2017.
2. Towpik K.: Infrastruktra transportu szynowego. OW Politechniki Warszawskiej, Warszawa, 2017. ISBN 978-83-7814-678-0
3. Hayes J.G., Goodarzi G.A.: Electric Powertrain. Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles. Wiley 2018.
4. Ehsani M., Gao Y., Longo S., Ebrahimi K.: Modern Electric, Hybrid Electric, and Fuel Cell Vehicles. 3rd Edition. CRC Press, 2018.
5. Siłka W.: Teoria ruchu samochodu. Warszawa: WNT 2002.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. Skibicki J.: Pojazdy elektryczne. Część 1. Wydawnictwo PG, 2010
2. Skibicki J.: Pojazdy elektryczne. Część 2. Wydawnictwo PG, 2012</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">• List and describe standards used in electric vehicles charging stations in Europe.
• Discuss the types and construction of hybrid combustion-electric cars.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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