



Subject card

Subject name and code	, PG_00053440						
Field of study	Electrical Engineering						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2024/2025		
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 Electrical Engineering of Transport -> Faculty of Electrical and Control Engineering						
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	To gain knowledge in selected areas of the field of electromobility.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U09	The student is able to select power and torque ratings of electric drivetrain based on assumed acceleration and maximal speed.			[SU1] Assessment of task fulfilment		
	K6_U10	The student is able to select the estimated capacity of an electric car battery to achieve the assumed range.			[SU3] Assessment of ability to use knowledge gained from the subject		
	K6_K01	The student finds by himself/herself information regarding selected parts of laboratory exercises.			[SK2] Assessment of progress of work		
	K6_W10	The student knows the structures of hybrid car drive systems and recognizes the energy transfer and transformation paths occurring in these structures.			[SW1] Assessment of factual knowledge		
Subject contents	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, transshipment infrastructure. Urban transport infrastructure, categories of streets, routing of tram lines, auxiliary infrastructure, metro and city rail lines, unconventional types of urban transport.						
Prerequisites and co-requisites	Accomplished course of "Electrical engineering in transport".						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory - raports and preparation	60.0%	30.0%
	Lecture - tests	60.0%	40.0%
	Excercises - final test	60.0%	30.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Dentom T.: Automobile Electrical and Electronic Systems. Taylor & Francis, 2017. 2. Towpik K.: Infrastruktura 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. 	
	Supplementary literature	<ol style="list-style-type: none"> 1. Skibicki J.: Pojazdy elektryczne. Część 1. Wydawnictwo PG, 2010 2. Skibicki J.: Pojazdy elektryczne. Część 2. Wydawnictwo PG, 2012 	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> • List and describe standards used in electric vehicles charging stations in Europe. • Discuss the types and construction of hybrid combustion-electric cars. 		
Work placement	Not applicable		