



## Subject card

Subject name and code	ELECTROMOBILITY, PG_00036790						
Field of study	Automation, Robotics and Control Systems						
Date of commencement of studies	February 2022	Academic year of realisation of subject				2022/2023	
Education level	second-cycle studies	Subject group					
Mode of study	Full-time studies	Mode of delivery				at the university	
Year of study	2	Language of instruction				Polish	
Semester of study	3	ECTS credits				2.0	
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	15.0	0.0	15.0	0.0	0.0	30
	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	30		5.0		15.0	50
Subject objectives	Gaining knowledge and practical skills in the scope of electromobility						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K7_U04	Students review references for gaining knowledge about vehicle's active safety systems, which is required to carry out lab exercise.			[SU2] Assessment of ability to analyse information		
	K7_W06	Students analyse torque control algorithms in traction electric drives.			[SW3] Assessment of knowledge contained in written work and projects		
	K7_W11	Students use specialized software for vehicles' energy consumption analysis.			[SW3] Assessment of knowledge contained in written work and projects		
	K7_U07	Students analyse energy consumption of autonomous and catenary-supplied vehicles.			[SU1] Assessment of task fulfilment		
K7_U03	Students present their proposal of simulation scenario.			[SU4] Assessment of ability to use methods and tools			
Subject contents	<p>Wykład: Elektryczne układy napędowe pojazdów. Samochody hybrydowe. Systemy ładowania samochodów elektrycznych. Sieci informatyczne w samochodach i infrastrukturze. Energochłonność samochodów elektrycznych.</p> <p>Laboratorium: Systemy kontroli trakcji w pojazdach elektrycznych wielosilnikowych. Kształtowanie profilu prędkości. Analiza energochłonności samochodów elektrycznych i hybrydowych. Analiza działania systemu ABS wykorzystującego napęd elektryczny bezpośredni.</p>						
Prerequisites and co-requisites	Basic knowledge in the fields of: electrical engineering, control engineering, electric machines, electric drives, solving differential equations.						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Lecture test		60.0%		60.0%		
	Raports and discussion		60.0%		40.0%		
Recommended reading	Basic literature		<p>Ehsani M., Gao Y., Longo S., Ebrahimi K.: Modern Electric, Hybrid Electric, and Fuel Cell Vehicles. 3rd Edition. CRC Press, 2018</p> <p>Hayes J.G., Goodarzi G.A.: Electric Powertrain. Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles. Wiley 2018.</p> <p>Skibicki J.: Pojazdy elektryczne. Część 1. Wydawnictwo PG, 2010</p> <p>Skibicki J.: Pojazdy elektryczne. Część 2. Wydawnictwo PG, 2012</p>				
	Supplementary literature		Siłka W.: Teoria ruchu samochodu. Warszawa: WNT 2002.				
	eResources addresses						

Example issues/ example questions/ tasks being completed	List the communication standards that are suitable for controlling vehicle's drivetrain. Discuss the motivation behind introducing constant-power operating region in vehicles.
Work placement	Not applicable