



Subject card

Subject name and code	Vehicle design, PG_00057462						
Field of study	Mechanical Engineering						
Date of commencement of studies	February 2022	Academic year of realisation of subject			2022/2023		
Education level	second-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Part-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Pojazdów Mechanicznych i Techniki Militarnej -> Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Wojciech Owczarzak					
	Teachers	dr hab. inż. Stanisław Taryma dr inż. Wojciech Owczarzak					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	20.0	10.0	0.0	10.0	0.0	40
	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	40	8.0		52.0	100	
Subject objectives	To acquaint students with selected methods of designing basic car assemblies.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K7_W10] possesses knowledge on the methods of technical and economic analysis of industrial systems and optimization of manufacturing systems; is familiar with the general principles of initiating and developing forms of individual entrepreneurship, particularly for innovative projects using the knowledge	The student is able to design the differential gear, the system for disengaging the friction clutch and select the hydrokinetic clutch for the combustion engine by the chosen method.			[SW1] Assessment of factual knowledge		
	[K7_W05] possesses profound knowledge on the operation of complex systems and mechanical devices, including process equipment	The student describes the structure of steering systems. Presents braking systems.			[SW1] Assessment of factual knowledge		
	[K7_U07] is able to perform a preliminary economic analysis of the undertaken engineering actions within the range of design, production and operation of machines and technical devices	The student is able to prepare the traction characteristics of a motor vehicle with a designed drive axle.			[SU1] Assessment of task fulfilment		

Subject contents	<p>LECTURE The general structure of a car. Characteristics of the engine and the necessary drive mechanisms. Drive mechanisms systems. Selection of gear ratios of the drive system. Clutches - types used. Construction, operation and calculation of friction clutches. Designing the clutch disengagement mechanism. Automatic control systems. Fluid clutches. Selection of clutch and torque converter for the engine. Stepped gearboxes. Synchronizers and gear shifting mechanisms. Planetary gears. Drive shafts and joints. Drive shaft systems. Critical shaft speed. The theory of joints and design solutions. Driving bridges: types, construction and calculation. Differentials, driveshafts and wheel bearings. Design of the driveshaft. Designing a steering trapezoid. Characteristics of the steering system. Calculation of the braking system.</p> <p>PROJECT Design a differential gear and driveshafts along with technical documentation. TUTORIALS Computational tasks concerning the mechanics of drive, braking and steering of the vehicle.</p>														
Prerequisites and co-requisites	Knowledge of the basics of machine construction and construction recording.														
Assessment methods and criteria	<table border="1" data-bbox="451 649 1487 790"> <thead> <tr> <th data-bbox="451 649 794 683">Subject passing criteria</th> <th data-bbox="794 649 1137 683">Passing threshold</th> <th data-bbox="1137 649 1487 683">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="451 683 794 716">Solve exercises from exercises</td> <td data-bbox="794 683 1137 716">80.0%</td> <td data-bbox="1137 683 1487 716">34.0%</td> </tr> <tr> <td data-bbox="451 716 794 750">Document the project</td> <td data-bbox="794 716 1137 750">100.0%</td> <td data-bbox="1137 716 1487 750">33.0%</td> </tr> <tr> <td data-bbox="451 750 794 790">Tests during the semester</td> <td data-bbox="794 750 1137 790">60.0%</td> <td data-bbox="1137 750 1487 790">33.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Solve exercises from exercises	80.0%	34.0%	Document the project	100.0%	33.0%	Tests during the semester	60.0%	33.0%
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Recommended reading	Basic literature	<p>1. Studziński K.: Samochód teoria, konstrukcja i obliczanie. Wyd. Naukowo-Techniczne, Warszawa, 1980. 2. Reimpel J.: Budowa samochodów Podstawy Konstrukcji, WKŁ, warszawa, 1997. 3. Zając M.: Układy przeniesienia napędu samochodów ciężarowych i autobusów. WKŁ, Warszawa, 2003. 4. Dębicki M.: Teoria samochodu, teoria napędu. WKŁ. Warszawa. 1975. 5. Prochowski L.: Pojazdy samochodowe, mechanika ruchu. WKŁ. Warszawa. 2005. 6. Jaśkiewicz Z.: Projektowanie układów napędowych pojazdów samochodowych. WKŁ, Warszawa, 1982.</p>													
	Supplementary literature	<p>1. Jaśkiewicz Z.: Poradnik Inżyniera Samochodowego Elementy i materiały WKŁ, Warszawa, 1990.</p> <p>2. Hebda M., Niziński S., Pelc H.: Podstawy diagnostyki pojazdów mechanicznych. WKŁ. Warszawa. 1980.</p>													
	eResources addresses														
Example issues/ example questions/ tasks being completed	<p>Design of the differential and driveshaft of the driving axle of the vehicle.</p> <p>Selection of equal and non-roller joints for the driving axle of the vehicle</p>														
Work placement	Not applicable														