GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basics Modeling of Drive Systems, PG_00039929		
Field of study	Mechanical Engineering, Mechanical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Machine Design and Vehicles -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Ryszard Woźniak	
	Teachers	dr inż. Ryszard Woźniak dr inż. Piotr Patrosz dr hab. inż. Jacek Kropiwnicki	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	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	45	6.0	24.0	75

Subject objectives	General introduction to the methods of creating, simulating the actions and actual properties of hydraulic drive systems, and pneumatic drive systems with internal combustion engines and propulsion systems of vehicles.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W11] possesses knowledge on design, technology and manufacturing of machine parts, metrology, and quality control; knows and understands methods of measuring and calculating basic values describing the operation of mechanical systems, knows basic calculating methods applied to analyse the results of experiments	Student describes: methods of creation and system simulation hydraulic drives and pneumatic systems propulsion with engines combustion and systems propulsion vehicles. calculates these systems.	[SW3] Assessment of knowledge contained in written work and projects
	[K6_U11] is able to analyse the operation of devices and compare the construction solutions applying usage, safety, environmental, economic and legal criteria	Student describes: methods of creation and system simulation hydraulic drives and pneumatic systems propulsion with engines combustion and systems propulsion vehicles. calculates these systems.	[SU1] Assessment of task fulfilment
	[K6_W08] possesses basic knowledge including the methodology of designing machine parts, mechanical devices, selection of construction materials, manufacturing and operation, with the lifetime cycle	Student describes: methods of creation and system simulation hydraulic drives and pneumatic systems propulsion with engines combustion and systems propulsion vehicles. calculates these systems.	[SW3] Assessment of knowledge contained in written work and projects
	[K6_U03] is able to identify, formulate and develop the documentation of a simple design or technological task, including the description of the results of this task in Polish or in a foreign language and to present the results using computer software or other aiding tools	Student describes: methods of creation and system simulation hydraulic drives and pneumatic systems propulsion with engines combustion and systems propulsion vehicles. calculates these systems.	[SU1] Assessment of task fulfilment
Subject contents	LECTURE Application of computer aidet modeling of pneumatic and hydraulic drive systems. Modeling of flow in the gaps. Modeling of fuel consumption of spark ignition engine. Modeling of torque of internal combustion engine. Simulation of operation of vehicle propulsion system with internal combustion engine for selected operating conditions. Construction of dry friction vehicle clutch, driving torque and friction work criteria, pressures, friction materials, plate spring dimensions, clutch steering system. Axle shafts: unloaded, semi-loaded and loaded. LABORATORY 1. Creation and analysis of the performance of the hydraulic drive system. 2. Creation and analysis of the performance of the pneumatic drive system. 3. Construction of electro hydraulic sequential control system. 4. Control of speed in pneumatics. 5. Modeling of fuel consumption of spark ignition engine. 6. Modeling of torque of internal combustion engine. 7. Simulation of operation of vehicle propulsion system with internal combustion engine for selected operating conditions. 8. Dry friction vehicle clutch modeling, driving torque and friction work criteria, estimation of pressures, choice of friction materials, plate spring dimensions modeling, calculations of clutch steering system. Axle shafts modeling: unloaded, semi-loaded and loaded.		
Prerequisites and co-requisites	No requirements		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Project	75.0%	50.0%
	Midterm colloquium	50.0%	50.0%
Recommended reading	Basic literature	1. Balawender i zespół. Laboratorium napędów hydraulicznych. Cz I. Podstawy hydrauliki. 2. J. Niegoda, W. Pomierski: Sterowanie pneumatyczne. Ćwiczenia laboratoryjne. 3. M. Bernhardt, S. Dobrzyński, E. Loth: Silniki samochodowe. WKiŁ, Warszawa 1988. 4. M. Cichy: Modelowanie systemów energetycznych. Wydawnictwo Politechniki Gdańskiej, Gdańsk, 2001. 5. Z. Jaśkiewicz i In.: Poradnik inżyniera samochodowego, elementy i materiały. WKiŁ, Warszawa, 1990. 6. Z. Jaśkiewicz: Projektowanie układów napędowych pojazdów samochodowych WKiŁ, Warszawa, 1982.	
	Supplementary literature	No requirements	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		