GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Vehicle Dynamics Theory, PG_00040100		
Field of study	Mechanical Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2023/2024
Education level	first-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	3	Language of instruction	Polish -
Semester of study	6	ECTS credits	5.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Institute of Mechanics and Machine Design -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Grzegorz Ronowski	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	22.0	15.0	0.0	0.0	0.0	37

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	37	10.0	78.0	125

Subject objectives

Presentation of issues related to the kinematics and dynamics of car movement, with particular emphasis on resistance to motion and overcoming them by the drive system with an internal combustion engine.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	The student describes the characteristics of the engines. It discusses the efficiency of car drive system components. It describes the grip of the tires. Selects the engine for the car. Calculates the value of gears in the car's drive system in the lowest gears. It determines the value of gear ratios in the car's propulsion system.	[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 knows characteristic of vehicles drive trains elements	[SW1] Assessment of factual knowledge

Subject contents

LECTURE Pneumatic drive transmission: rolling with skid, rolling with high deformability of tires, normal and tangential reactions of the surface, grip, energy losses, forces in the area of contact between the tire and the road. Resistance to motion: air, elevation, inertia and towing. Forces and moments of forces acting on a vehicle in a rectilinear motion. Limit values of the ground reaction forces. Different drive systems - comparison of properties. Cooperation of the engine with the drive system of a traction vehicle. Drive transmission efficiency. Vehicle traction properties: power balance, force balance, dynamic indicators and diagrams, acceleration distance and time. Gear selection. Influence of hydrokinetic drive transmission on vehicle traction properties. Braking of vehicles.

TUTORIALS Movement resistance: Calculations of: air resistance, rolling, elevation, inertia, twist and pull, forces and moments acting on the vehicle in straight and curvilinear motion. Calculation of the limit values of the ground reaction forces. Calculations of the efficiency of the drive transmission. Calculations: power balance, power balance, dynamic indicators, acceleration distance and time. Calculation of the gear ratio in the drive system. Determining the distribution of forces on individual wheels during car braking.

Prerequisites and co-requisites	Knowledge of high school mathematics and physics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Final test grade	60.0%	100.0%
Recommended reading	Basic literature	1. Basics of Vehicle Dynamics by Dr Boris Stojić. 2. Vehicle Dynamics Course by MH Monish Gowda Hima Kiran Vithal V. 3. Tyre dynamics and tyre as a vehicle component by J P Pauwelussen W Dalhuijsen and M Merts. 4. Vehicle DynamicsCompendium for course MMF062 by Bengt Jacobson et al.	
	Supplementary literature	-	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	-		
Work placement	Not applicable		