COURSE DESCRIPTION CARD - SYLLABUS

Course name
Road vehicles construction [S1Trans1>BPD]

Course

Field of study
Transport

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

The student has a basic knowledge of machine science, mechanics, the basics of machine construction and the laws of physics. The student is able to integrate the obtained information, interpret it, draw conclusions, read diagrams and technical drawings. The student is aware of the role of means of transport in human economic activity.

Course objective

Providing students with information on the construction and operation of systems, assemblies and mechanisms of road vehicles.

Course-related learning outcomes

Knowledge:
The student has an ordered, theoretically founded general knowledge of technology, transport systems and various means of transport
The student has a basic knowledge of the life cycle of means of transport, both equipment and software, and in particular about the key processes occuring in the product life cycle

Skills:
The student is able to make a critical analysis of the functioning of transport systems and other technical solutions and to evaluate these solutions, including: is able to effectively participate in the technical inspection and assess the transport task from the point of view of non-functional requirements, has the ability to systematically conduct functional tests

Social competences:
The student is aware of the importance of knowledge in solving engineering problems, knows examples and understands the causes of malfunctioning transport systems that have led to serious financial and social losses or to serious loss of health and even life
The student correctly identifies and solves dilemmas related to the profession of a transport engineer

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
The knowledge acquired during the lecture is verified by a written exam.
Mandatory individual reports on laboratory activities. Final credit of laboratory classes.

Programme content

Road vehicle powertrain. Driving sources of motor vehicles and their characteristics. Types of drive transmission systems.
Automotive clutches. Tasks and types of clutches. Disc friction clutches.
Gearboxes. Tasks, types and principles of operation of gearboxes. Mechanical stepped gearboxes with fixed axles used in passenger cars. Mechanical step-by-step gearboxes with fixed axles used in trucks. Hydromechanical stepped automatic gearboxes with rotating axles. Mechanical, continuously variable, automatic gearboxes.
Drive shafts and joints. Construction and tasks of drive shafts. Types and tasks of joints.
Final gears and differentials. Construction and tasks of the main gear. Construction and tasks of the differential gear. Construction and tasks of the drive axle housing.
Drive shafts and hubs. Construction and tasks of driveshafts and wheel hubs.
Drive on more than one axle. All-wheel drive in passenger cars. Drive on more than one axle on trucks.
Braking system. Types of brake systems. General structure and operation of the braking system. Drum brakes. Disc brakes. Mechanisms that actuate the brakes. The mechanism of hydraulic actuation of the main brake. Mechanism of electrohydraulic and electromechanical brake actuation. Mechanism for pneumatic actuation of brakes in trucks and buses. Electropneumatic brake actuators. Parking brake actuators. Braking force distribution systems. Long-term brakes.
Steering system. Car movement stability. Types of steering systems. Construction of the steering system. Steering mechanism. The steering mechanism. Power steering mechanisms. Diagnostic parameters determining the alignment of the wheels and axles of the vehicle. Turning resistance of steered wheels. Special steering systems. Active steering systems.
Chassis. Vehicle vibrations and their influence on driving comfort and safety. Suspension system. Types of vehicle suspensions. Suspensions with steel spring elements. Suspensions with spring elements made of rubber and plastic. Suspensions with pneumatic spring elements. Hydropneumatic suspensions. Active electromagnetic suspensions. Semi-active suspensions with adjustable damping
Wheels. Construction and types of tires. Tire markings. Requirements for tires. Rims.
Motor vehicle bodies. Car bodies of passenger cars and cars. Breakdown of bodies. Body building. Bus bodies. Breakdown of bus bodies. Construction of bus bodies. Truck bodies. Cabins. Universal utility bodies. Specialized utility bodies. Interchangeable utility bodies. Special truck bodies.
Road vehicle support scructures. Construction and tasks of the vehicle frame. Trailers and semitrailers.
Safety and driving comfort systems. Active safety and driving comfort systems. Passive safety systems.
Legal requirements, types of lighting, types and properties of different light sources.

Course topics

none

Teaching methods

Lecture with multimedia presentation.

Laboratory classes: independent performance of tasks given by the teacher - practical exercises.

Bibliography

Basic
Prochowski L.: Mechanika ruchu. WKŁ, W-wa, 2005
Jackowski J., Łęgiewicz J., Wieczorek M.: Samochody osobowe i pochodne. WKŁ, W-wa, 2011
Prochowski L., Żuchowski A.: Samochody ciężarowe i autobusy. WKŁ, W-wa, 2004
Reimpell J., Betzler J.: Podwozia samochodów. Podstawy konstrukcji. WKŁ, W-wa, 2003
Zając M.: Układy przeniesienia napędu samochodów ciężarowych i autobusów. WKŁ, W-wa, 2003
Gabryelewicz M.: Podwozia i nadwozia pojazdów samochodowych cz. 1/2. WKŁ, W-wa, 2018
Additional
Heising B., Ersoy M.: Chassis Handbook. Vieweg + Teubner Verlag, Wiesbaden, 2011
Meywerk M.: Vehicle dynamics. John Wiley & Sons Ltd, Chichester, 2015

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	55	2,00