



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Vehicle chassis construction

### Course

Field of study

Year/Semester

Construction and Exploitation of Means of Transport

3/6

Area of study (specialization)

Profile of study

Motor vehicles

general academic

Level of study

Course offered in

First-cycle studies

Polish

Form of study

Requirements

part-time

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

18

9

0

Tutorials

Projects/seminars

0

0

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

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### 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 vehicle chassis systems.



### Course-related learning outcomes

#### Knowledge

The student knows the tasks, structure and properties of various types of basic vehicle systems.

The student knows the range of applications of particular varieties of basic vehicle systems.

The student knows the influence of individual systems on the road safety of a motor vehicle.

#### Skills

He can interpret the phenomena accompanying the movement of the car in terms of its physical foundations and limitations.

The student can describe the tasks, principles of operation, design and functional variations, properties and the scope of applications of various solutions of mechanisms and assemblies of the main vehicle systems.

#### Social competences

The student knows the impact of vehicles on the efficiency of human operation and the environment.

The student is able to independently develop his knowledge of the construction and properties of vehicles and their components.

### Methods for verifying learning outcomes and assessment criteria

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

Tasks and general construction of the chassis structural systems.

Braking system - tasks and general structure. The course of the braking process and the forces acting on the vehicle during braking.

Braking mechanisms. Drum brakes. Disc brakes. Self-regulating clearance mechanisms.

Mechanisms that actuate the brakes. The mechanism of hydraulic actuation of the main brake.

Mechanism of electrohydraulic and electromechanical brake actuation.

Mechanism of pneumatic actuation of brakes in trucks and buses. Electropneumatic brake actuators.

Parking brake actuators. Mechanical and electro-mechanical parking brakes.

Braking force distribution systems. Car anti-lock systems.

Long-term brakes. Electromagnetic retarders. Hydrodynamic brakes.



Steering system - requirements and general structure of the steering system. Forces acting on a vehicle moving in a curve. Car movement stability.

Types of steering systems. Basic quantities determining the alignment of wheels and axles of the vehicle.

Steering mechanism. Steering wheel, steering shaft, steering gear. Worm, ball screw, rack and pinion steering gears.

The steering mechanism. Linkage trapezoid. Steering knuckles, steering link rods, steering linkage joints.

Power steering mechanisms. Hydraulic, electro-hydraulic, electric power steering.

Active steering systems. Steer by wire systems.

The steering systems of four steered wheels and the systems of automatic steering of the rear axle wheels

Special steering systems. Steering systems of trucks ensuring the turning of the wheels of several axles of a vehicle, trailer or semi-trailer.

Suspension tasks and suspension classification. Vehicle vibrations and their influence on driving comfort and safety.

Types of vehicle suspensions. Dependent, independent, semi-independent suspensions.

Suspension guiding elements. Suspension arms, reaction rods, metal and rubber suspension elements.

Spring elements of suspensions (steel, pneumatic, rubber) and spring characteristics. Suspension travel limiters.

Damping elements and damping characteristics. Single-tube, two-tube shock absorbers.

Stabilizers - elements reducing the lateral tilt of the vehicle body.

Adjustable and active suspensions. Methods of adjusting the damping force.

Wheels. Requirements for tires. Construction and types of tires. Tire markings. Rims.

### 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

Gabryelewicz M.: Podwozia i nadwozia pojazdów samochodowych cz. 2 Układ hamulcowy i kierowniczy, zawieszenie oraz nadwozie. WKŁ, W-wa, 2018

#### Additional

Heising B., Ersoy M.: Chassis Handbook. Vieweg + Teubner Verlag, Wiesbaden, 2011

Breuer B., Bill K.: Brake Technology Handbook. SAE International, Warrendale, 2008

Harrer M., Pfeffer P.: Steering Handbook. Springer, 2017

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	27	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation for exam) <sup>1</sup>	33	1.0

<sup>1</sup> delete or add other activities as appropriate