COURSE DESCRIPTION CARD - SYLLABUS

Course name
Running systems of rail vehicles [S2MiBP1-PSz>UBPSz]

Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
1/1

Area of study (specialization)
Railway Vehicles

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

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

Acquainting with the construction and operation of running systems of rail vehicles, such as locomotives, multiple units, carriages, trams and other types of vehicles. Presentation of loads acting on the vehicle and their assemblies and the rules of driving the vehicle on the track. Overview of the basics of design and operation of modern rail vehicles

Course-related learning outcomes

Knowledge:
Has extended knowledge of mathematics in the field of numerical methods used in optimization tasks, computer simulation, linear algebra, interpolation and approximation.
Has extended knowledge of physics in the field of contemporary physical problems conditioning the

progress in technical sciences: solid state physics nonlinear optics, nuclear physics and new research methods used in physics.
Has a general knowledge of the principles and methods of constructing working machines, in particular the methods of functional and strength calculations, mathematical optimization of mechanical structures and modeling of machine structures in 3D systems.

Skills:
Is able to carry out basic measurements of mechanical quantities on the tested working machine with the use of modern measuring systems.
Can perform a medium complex design of a working machine or its assembly using modern CAD tools, including tools for spatial modeling of machines and calculations using the finite element method.
He can design the technology of exploitation of a selected machine with a high degree of complexity.

Social competences:
He is ready to critically assess his knowledge and received content.
Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.
Is willing to think and act in an entrepreneurial manner.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Written credit

Programme content

Types of railway bogies and their tasks. Bogie frames. Wheelsets. Bearing nodes. Alignment in track curves. Springs and dampers for rail vehicles. Body backrests (suspension) on bogies. The use of the driving mass of locomotives and methods of transferring longitudinal forces from the driving and rolling bogies to the body. Structures of railway bogies. Locomotive driving bogies. Bogies of high-speed multiple units. Electric multiple unit (EMU) driving bogies. Passenger bogies. Two-axle driving and rolling bogies for public transport vehicles and subway trains. Traditional trams. Bogies for low-floor trams.
Freight bogies.

Course topics

The subject of the classes is focused on getting to know the structure of running gears of modern rail vehicles. Examples of the construction of locomotive bogies, multiple units, passenger and freight wagons, metro vehicles and trams are presented.

Teaching methods

Lecture with multimedia presentation

Bibliography

Basic
1. Romaniszyn Z.: Podwozia wózkowe pojazdów szynowych, Wydawnictwo Instytutu Pojazdów Szynowych Politechniki Krakowskiej, Kraków 2010
2. Maksym Spiryagin, Colin Cole, Yan Quan Sun, Mitchell McClanachan, Valentyn Spiryagin, Tim McSweeney: Design and Simulation of Rail Vehicles, CRC Press 2017. ISBN 9781138073708
3. W. Gąsowski: Wagony kolejowe - konstrukcja i badania. WKŁ, Warszawa 1988.
4. W. Gąsowski, Z. Durzyński, Z. Marciniak: Elektryczne pojazdy trakcyjne. Wyd. Polit. Poznańskiej, Poznań 1995.
5. W.Gąsowski, Z,. Marciniak: Konstrukcje oraz modele wózków i układów zawieszeń wagonów i lokomotyw. Wyd. Polit. Poznańskiej, Poznań 1993.
Additional
1. J. Gronowicz , B. Kasprzak: Lokomotywy spalinowe. WKŁ, Warszawa 1989.
2. Z. Romaniszyn, Z. Oramus, Z. Nowakowski: Podwozia trakcyjnych pojazdów szynowych. WKŁ, Warszawa 1989.

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,50