COURSE DESCRIPTION CARD - SYLLABUS

Course name
Construction of rail vehicles [S1Trans1>BPSz]

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 the means of transport. He can use the acquired knowledge to analyze specific phenomena and processes occurring in the movement of objects. Demonstrates independence in solving problems, gaining and improving acquired knowledge and skills.

Course objective

The aim of the course is to familiarize students with the construction of rail vehicles. Students acquire general knowledge and skills in the field of types of rail vehicles and their construction and construction of rail vehicle assemblies.

Course-related learning outcomes

Knowledge:
1.The student has extended and in-depth knowledge of physics useful for formulating and solving selected technical tasks, in particular for correct modeling of real problems.
2. The student has an ordered, theoretically founded general knowledge of technology, transport systems and various means of transport.
3. 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:
1. The student can properly use information and communication techniques, applicable at various stages of the implementation of transport projects.
2. The student is able to properly plan and conduct perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions.
3. The student is able to assess the computational complexity of algorithms and transport problems.

Social competences:
1. The student can think and act in an entrepreneurial way, incl. finding commercial applications for the created system, taking into account not only business benefits, but also social benefits of the conducted activity.
2. The student is aware of the social role of a technical university graduate, in particular, he/she understands the need to formulate and transfer to the society, in an appropriate style, information and opinions on engineering activities, technological achievements, as well as the achievements and traditions of the transport engineer profession

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 exam, final test

Programme content

Historical development of vehicles, types of trains and rail vehicles. Vehicle construction standards organizations. Breakdown of rail vehicles. Types of traction, types of currents in electric traction. Track widths and geometry.
Geometry and wheel guidance on the track, stability of rail vehicles. The specificity of individual wheels. Safety, running quality, gauge, comfort and noise standards and their impact on vehicle structure.Vehicle bodies: skeleton, cradle (frame), plating. Structural aluminum, non-metallic elements. Loads acting on the vehicle and vehicle durability, passive safety.
Types of chassis for rail vehicles. Railroad carriages, their tasks. Unusual chassis solutions. General overview of the undercarriage components: wheels, wheel sets, bearing, wheel set guidance, suspension springs, damping elements, air suspension, hanger suspension. Elements of longitudinal and lateral forces transfer from the body.
Inter-car coupling. The use of rubber and plastics in chassis components. Inter-car couplings: non-automatic and automatic, types of standard couplings and couplings from different manufacturers. Construction of inter-car buffers, problem of longitudinal forces in the train and timing of carriages.
Division of locomotives, general construction of diesel and electric locomotives. Locomotive bodies, driver"s cabins. Types and construction of diesel engines of locomotives. Types and structure of drive gears, structure of drive transmission systems, paraxial gears. Electric locomotive drive system and electric drive transmission of diesel locomotive: types of currents and controls (main generators), types and construction of traction motors. Traction control of a traction vehicle, traction characteristics of locomotives.
Machines and auxiliary devices in rail vehicles. Rail vehicle and train computer networks.
Overview of examples of locomotives
Types of railway brakes, overview and construction.
Overview of the construction of steam locomotives: their types, principle of operation, boiler layout, timing.
Construction of passenger carriages, elements of passenger car equipment, wagons with a tilting body.
Freight wagons: types, structure, Types and structure of self-unloading wagons.
High-speed trains, traction units, suburban vehicles, rail buses
Trams: types, construction. Overview of contemporary design solutions.
Monorails: types, supporting and propulsion systems
Magnetic railways: types, track structure, lifting system. Drive system.
Special vehicles: bimodal wagons, rail-road vehicles, cranes, tugs.

Course topics

none

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board.
Laboratories: demonstration with explanation and instruction, conducting the experiment yourself

Bibliography

Basic
1. T. Piechowiak: Hamulce pojazdów szynowych. Wydawnictwo Politechniki Poznańskiej. Poznań 2012.
2. Z. Romaniszyn : Podwozia wózkowe pojazdów szynowych. Wyd. Pol. krakowskiej, 2005.
3. J. Madej: Teoria ruchu pojazdów szynowych. Of. Wyd. Pol. War. Warszawa 2004.
4. J. Gronowicz, B. Kasprzak: Lokomotywy spalinowe. WKŁ, Warszawa 1989.
5. Gąsowski w., Sobaś M. Nowoczesna skrajnia pojazdów szynowych. IPS Poznan 2005.
6. W. Gąsowski, Z. Durzyński, Z. Marciniak: Elektryczne pojazdy trakcyjne.. Wyd. Ucz. P.P., Poznań 1995.
7. W. Gąsowski: Wagony kolejowe, konstrukcja i badania. WKŁ, Warszawa 1988.
8. W. Gąsowski, M. Sobczak: Układy biegowe wagonów kolejowych. Wyd P.P. Poznań 1987.
Additional
1. J. Madej (red): Technika taboru drogowo-szynowego (bimodalnego). Inst. Pojazdów Szynowych Poznań 2000.
2. Czasopisma fachowe: Technika Transportu Szynowego, Pojazdy Szynowe

Breakdown of average student's workload

	Hours	ECTS
Total workload	90	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)	45	2,00