



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of vehicle dynamics

Course

Field of study

Construction and Exploitation of Means of Transport

Area of study (specialization)

Railway Vehicles

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish/english

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Bartosz Firlik

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Faculty of Civil and Transport Engineering

ul. Piotrowo 3, pok. 722, 60-965 Poznań

Responsible for the course/lecturer:

mgr inż. Tomasz Staśkiewicz (ćwiczenia)

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Prerequisites

Basic information on vehicle construction, dynamics and strength of materials.

Course objective

Understanding the principles of vehicle design, mainly concerning vehicle dynamics, aimed at meeting given operational requirements, also based on durability, ergonomics and cost analysis.

Course-related learning outcomes

Knowledge

1. Has a structured and theoretically founded general knowledge related to key issues in the field of transport engineering



2. Has knowledge of development trends and the most important new achievements of means of transport and other selected, related scientific disciplines

Skills

1. Can obtain information from literature, databases and other sources (in Polish and English), integrate them, interpret and critically evaluate them, draw conclusions and formulate and exhaustively justify opinions
2. Can use information and communication techniques used in the implementation of projects in the field of transport
3. Can - using, among others conceptually new methods - solve complex tasks in the field of transport engineering, including atypical tasks and tasks with a research component.

Social competences

1. Understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems
2. Is aware of transferring the acquired knowledge to the public, makes efforts to make this information understandable, presents various solutions and points of view

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The final grade takes into account both the grade from the written exam as well as the student's activity during the classes and preparation for them.

Programme content

Criteria for assessing the dynamic properties of the vehicle. Methods of measuring dynamic properties. Kinematic parameters of the track and operational parameters influencing the design of the vehicle. Forces affecting the vehicle.

Dynamics of vehicle and drive systems, equations of motion and methods of their solution. Methods of computer modeling of dynamic properties and vehicle strength analyzes, their use in vehicle design. The problem of the contact of a wheel with a rail or a tire with the road. Track handling, stability, vibration damping, wear of vehicle components. Driving comfort issues.

Selection of vehicle structures according to functional properties: safety and ride quality, durability, passenger comfort, reduction of wear and damage to vehicles, vehicle life costs. Modern utility solutions for vehicles.

Teaching methods

1. Lecture with multimedia presentation
2. Tutorials - selected analyzes and calculations of vehicle dynamics



Bibliography

Basic

1. Iwnicki S. (red.), Handbook of Railway vehicle dynamics. Taylor & Francis, 2006
2. Anderson E., Berg M., Stichel S.: Rail Vehicle Dynamics, Railway Group KTH, Stockholm 2014
3. Kisilowski J. (red.), Dynamika układu mechanicznego pojazd szynowy-tor. PWN, Warszawa 1991.
4. Kisilowski J., K. Knothe K. (red.), Advanced railway vehicle system dynamics. WNT, Warszawa 1991.

Additional

1. Gąsowski W., Marciniak Z., Konstrukcje oraz modele wózków i układów zawiesznień wagonów i lokomotyw. Wyd. Politechniki Poznańskiej, Poznań 1993.
2. Pacejka H., Tyre and vehicle dynamics. Butterworth-Heinemann, Oxford 2005.
3. International and local standards

Breakdown of average student's workload

	Hours	ECTS
Total workload	65	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	20	1,0

¹ delete or add other activities as appropriate