



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Advanced Course of Railway Transportation

Course

Field of study

Year/Semester

Transport

3/5

Area of study (specialization)

Profile of study

Rail Transport

general academic

Level of study

Course offered in

First-cycle studies

english

Form of study

Requirements

full-time

elective

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

20

4

0

Tutorials

Projects/seminars

0

14

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

WILiT lecturers, invited professors and selected specialists from the rail transport industry

Faculty of Civil and Transport Engineering (WILiT)

Piotrowo 3 Street, 61-138 Poznan

Responsible for the course/lecturer:

Ph.D. Eng. Paweł Komorski

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Faculty of Civil and Transport Engineering

Piotrowo 3 Street, 61-138 Poznan

Prerequisites

Basic knowledge of the construction and operation of rail vehicles, rail transport management and the physics of phenomena occurring in mechanical objects. Basic knowledge of metrology and the scope of measurements of mechanical quantities. Basic information on linear algebra and statistics. The student should have the ability to obtain information from literature, the Internet, databases and other industry sources, and be able to integrate the information obtained; interpret and draw conclusions from them as well as create and justify own opinions.

Course objective

The aim of the course is to acquire theoretical knowledge and learn about practical problems related to the organization and management of rail transport, as well as the construction and operation of rail vehicles. In addition, the course includes content related to the law and organization of rail transport in



Europe as well as the operation and safety of rail vehicles. An additional goal is to promote the Poznań University of Technology and Polish culture among foreign students as an attractive place to study.

Course-related learning outcomes

Knowledge

1. The student has ordered and theoretically founded general knowledge in the field of key issues of technology and detailed knowledge in the field of selected issues in this discipline of transport engineering.
2. 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 occurring in the product life cycle.
3. The student knows the basic techniques, methods and tools used in the process of solving tasks in the field of transport, mainly of an engineering nature engineering.

Skills

1. The student is able to properly plan and conduct perform experiments, including measurements and computer simulations, interpret the obtained results, and correctly draw conclusions.
2. Student is able, when formulating and solving tasks in the field of transport, to apply appropriately selected methods, including analytical, simulation or experimental methods.
3. The student has the ability to formulate tasks in the field of transport engineering and their implementation using at least one of the popular tools.

Social competences

1. The student understands that in technology, knowledge and skills very quickly become obsolete.
2. 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.
3. 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.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Monitoring student activity in the eKursy system, discussion as well as ongoing preparation and activity in classes.

Programme content

The implementation of the course will consist in conducting a number of the most important types of classes (lecture, design and laboratory) in the field of the rail transport organization and the operation of rail vehicles, i.e. .:



1. Fundamentals of Railway Transportation
2. Structural Design of Railway Vehicles
3. Structural Design of Railway Infrastructure
4. Diagnostics in Railway Transportation
5. International Railway Cooperation
6. Environmental Impact of Railway Transportation
7. Challenges of Modern Railway Transportation
8. Maintenance of Railway Vehicles
9. Raiwal Traffic Control
10. Discussion panel with professionals
11. Promotion of the Poznań University of Technology and Polish culture

Teaching methods

1. Lecture with multimedia presentation and films
2. Projects (including exercises and laboratories) - solving case study tasks, conducting experimental research

Bibliography

Basic

1. F. Flammini, Railway Safety, Reliability, and Security: Technologies and Systems Engineering, Information Science Reference, 2012
2. C. Esveld, Modern Railway Track. MRT-Productions, 2001
3. F. Naser, Railway Systems: Systems Engineering Fundamentals, 2023
4. C. Cempel, Vibroacoustic condition monitoring (Ellis Horwood Series in Mechanical Engineering), Elsevier, 1992

Additional

1. M. Guerrieri, Fundamentals of Railway Design, Springer, 2023
2. R. Lewis, U. Olofsson (Ed.), Wheel–Rail Interface Handbook. Woodhead Publishing Limited, 2009.
3. T. Nowakowski, F. Tomaszewski, P. Komorski, G. M. Szymanski, Tram gearbox condition monitoring method based on trackside acoustic measurement, Measurement, vol. 207, 2023, DOI: 10.1016/j.measurement.2022.112358



Breakdown of average student's workload

	Hours	ECTS
Total workload	53	2,0
Classes requiring direct contact with the teacher	38	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	15	0,5

¹ delete or add other activities as appropriate