



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Challenges of the modern rail transport

### Course

Field of study

Year/Semester

Transport

1/2

Area of study (specialization)

Profile of study

Rail Transport

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

full-time

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

15

0

0

Tutorials

Projects/seminars

15

0

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Bartosz Firlik

Responsible for the course/lecturer:

mgr inż. Mateusz Motyl

Instytut Transportu

Instytut Transportu

Wydział Inżynierii Lądowej i Transportu

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### Prerequisites

Basic knowledge of the operation and management of rail transport, basic computer skills and working in groups

### Course objective

The aim of the course is to provide students with expanded knowledge about the functioning of modern rail transport. Expanding the student's knowledge related to the operation, construction and management of rail transport and various types of rail vehicles in the modern and contemporary world. Presentation of current trends and challenges for international rail transport.



### Course-related learning outcomes

#### Knowledge

1. The student has an ordered and theoretically founded general knowledge related to key issues in the field of transport engineering
2. The student has advanced and detailed knowledge of the processes occurring in the life cycle of transport systems
3. The student has knowledge of development trends and the most important new achievements of means of transport and other selected related scientific disciplines

#### Skills

1. The student is able to 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. The student is able - when formulating and solving engineering tasks - to integrate knowledge from various areas of transport (and, if necessary, also knowledge from other scientific disciplines) and apply a systemic approach, also taking into account non-technical aspects
3. The student is able to make a critical analysis of existing technical solutions and propose their improvements (improvements)

#### Social competences

1. The student understands that in the field of transport engineering, knowledge and skills very quickly become obsolete
2. The student understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

For discussion, ongoing preparation and activity in class. Written credit for lectures (min. 51% of points) and written credit for classes

### Programme content

Technical possibilities as well as trends and challenges in construction and operation (rolling stock and infrastructure):

1. Weight reduction in the construction of modern rail vehicles, non-metallic materials in the construction of vehicles
2. Noise reduction in rail transport (rolling stock and infrastructure)
3. Increasing the comfort of driving in rail vehicles



4. Reducing the emission of harmful compounds to the environment (hybrid and battery drives, renewable energy sources)
5. Shortening the travel and service time in the transport of goods, multimodal transport
6. Increasing active and passive safety in rail transport (rolling stock and infrastructure)
7. Improving access to rail transport for people with reduced mobility
8. Autonomous vehicles
9. Monitoring the technical condition of the rolling stock and infrastructure
10. Legislative aspects of rolling stock and infrastructure

### Teaching methods

1. Lecture with multimedia presentation
2. Tutorials - solving tasks and carrying out the case study exercises

### Bibliography

#### Basic

1. L. Mindura, Technologie Transportowe XXI wieku, Wydawnictwo ITeE-PIB, 2008
2. M. Jacyna, P. Gołębiowski, M. Krześniak, J. Szkopiński, Organizacja ruchu kolejowego, Wydawnictwo Naukowe, 2019
3. M. Przybyszewski, Elektryczne zespoły trakcyjne. Budowa, działanie, zasady utrzymania i obsługi, Wydawnictwa Komunikacji i Łączności, 2017
4. G. Rosa, Nowoczesny marketing kolejowych przewozów pasażerskich, Wydawnictwo Naukowe Uniwersytetu Szczecińskiego 2020
5. J. Engelhart, Sektor kolejowy w polityce transportowej Unii Europejskiej, 2019;
6. Czasopisma branżowa, materiały konferencyjne oraz materiały informacyjne z międzynarodowych targów branżowych.

#### Additional

1. Maksym Spiriyagin, Colin Cole, Yan Quan Sun, Mitchell McClanachan, Valentyn Spiriyagin, Tim McSweeney: Design and Simulation of Rail Vehicles, CRC Press 2017, ISBN 9781138073708.
2. R. Buł, Problemy funkcjonowania transportu publicznego w obszarach metropolitalnych na przykładzie Aglomeracji Poznańskiej, Centrum Badań Metropolitalnych, Uniwersytet im. Adama Mickiewicza, Poznań.



3. Analysis of the applicability of new test methods in the certification of light rail vehicles / Mateusz Motyl (WIT), Franciszek Tomaszewski (WIT) // W: Tezi dopovidej mižnarodnoï naukowo-tehničnoï konferencii „Tehnologii ta infrastruktura transportu”, 2018 - s. 510-511
4. R. Bul, Problemy funkcjonowania transportu publicznego w obszarach metropolitalnych na przykladzie Aglomeracji Poznańskiej, Centrum Badań Metropolitalnych, Uniwersytet im. Adama Mickiewicza, Poznań.
5. Certification Requirements For Tram Noise Measurements In Terms Of Today's Expectations In Cities / Mateusz Motyl (WMRiT), Tomasz Nowakowski (WMRiT), Bartosz Czechyra (WMRiT), Bartosz Firlik (WMRiT) // W: Sustainable Development and Planning VIII / red. C. A. Brebbia, S.S. Zubir, A. S. Hassan - Southampton, Wielka Brytania : WIT Press, 2017 - s. 591-596

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	70	3,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	40	1,5

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