



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Railway transportation Environmental Hazards [S2Trans1-TrSz>ZŚpTS]

### Course

Field of study

Transport

Year/Semester

1/2

Area of study (specialization)

Railway Transport

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

15

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

dr hab. inż. Małgorzata Orczyk prof. PP  
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### Lecturers

### Prerequisites

**KNOWLEDGE:** The student has an orderly and theoretically founded knowledge in the field of operation of rail means of transport, knows the general characteristics of the functional properties and basic technical and operational parameters of rail means of transport, and has a basic knowledge of issues related to environmental hazards caused by transport. **SKILLS:** The student is able to use the acquired knowledge to solve simple problems related to determining the impact of transport on the environment. **SOCIAL COMPETENCES:** The student shows independence in solving problems, gaining and improving the acquired knowledge and skills, is aware of the importance and understands the non-technical aspects and effects of rail transport on the environment.

### Course objective

To acquaint students with the basic concepts of environmental protection, the existing threats resulting from the operation of rolling stock and the necessary actions leading to the reduction of the negative impact of rail transport on the environment and people in the vehicle.

### Course-related learning outcomes

Knowledge:

Student has advanced detailed knowledge of selected issues in the field of transport engineering  
Student knows advanced methods, techniques and tools used in solving complex engineering tasks and conducting research in a selected area of transport

**Skills:**

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

Student is able to plan and conduct experiments, including measurements and simulations, interpret the obtained results and draw conclusions as well as formulate and verify hypotheses related to complex engineering problems and simple research problems

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

**Social competences:**

Student understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems

Student understands the importance of popularizing the latest achievements in the field of transport engineering

Student is aware of the need to develop professional achievements and to observe the rules of professional ethics

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam, final colloquium

### Programme content

The module program covers the following issues:

1. Identification of selected threats generated by rail means of transport.
2. Assessment and analysis of the impact of vibroacoustics phenomena generated by rail means of transport on humans and the environment

### Course topics

The lecture program covers the following topics:

1. The impact of rail transport on humans and the environment.
2. The impact of sound and mechanical vibrations generated by rail means of transport on humans.
3. Impact of noise and mechanical vibrations generated by rail means of transport on the environment
4. Assessment of noise and vibration of rail means of transport.
5. Summary of classes.

The exercise program covers the following topics:

1. Identification and characterization of the main environmental pollutants related to the operation of rail means of transport.
2. Introduction to the impact of sound and mechanical vibrations
3. Assessment of the impact of noise in rail vehicles on humans - spectral analysis.
4. Assessment of noise and vibrations at the workplace.
5. Assessment of rail noise in the environment.
6. Assessment of mechanical vibrations in selected locomotive systems.
7. Passing the classes.

### Teaching methods

Lecture with multimedia presentation.

Practical exercises, accounting calculations.

## Bibliography

### Basic

1. Makarewicz R.: Hałas w środowisku. Ośrodek Wydawnictw Naukowych, Poznań 1996.
2. Nader M.: Modelowanie i symulacja oddziaływania drgań pojazdów na organizm człowieka. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001.
3. Thompson D.: Railway Noise and Vibration - Mechanisms, Modelling and Means of Control. Publisher Elsevier 2009. Pełnotekstowe Książki w wersji elektronicznej dostępne przez Bibliotekę Politechniki Poznańskiej (Knovel Library).
4. Zwierzycki W.: Płyty eksploatacyjne do środków transportu drogowego. Charakterystyka funkcjonalna i ekologiczna. Wydawnictwo Politechniki Poznańskiej, Poznań 2006.
5. Juda-Rezler K.: Oddziaływanie zanieczyszczeń powietrza na środowisko. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006.
6. Normy i rozporządzenia związane z oceną hałasu i drgań mechanicznych w szynowych środkach transportu.

### Additional

1. Boć J., Nowacki K., Samborska-Boć E.: Ochrona środowiska. Wydawnictwo Kolonia Spółka z o.o. Kolonia Limited 2008.
2. Gronowicz J.: Ochrona środowiska w transporcie lądowym. Wydawnictwo i Zakład Poligrafii Instytutu Technologii Eksploatacji Radom 2003.

## Breakdown of average student's workload

	Hours	ECTS
Total workload	65	3,00
Classes requiring direct contact with the teacher	40	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00