

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Railway transportationEnvironmental hazards		Code 1010612221010622292
Field of study Transport	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 2
Elective path/specialty Railway Transport	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 1 Classes: - Laboratory: - Project/seminars: -		No. of credits 1
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 1 100%
Responsible for subject / lecturer: Małgorzata Orczyk DEng. email: malgorzata.orczyk@put.poznan.pl tel. +48 (61) 665 2017 Faculty of Working Machines and Transportation Piotrowo 3 street, 60-965 Poznan		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Students have systematic knowledge gained on the basis of theory about operational use of rail means of transport. Students know general characteristics of functional properties and elementary technical and operational use parameters of rail means of transport. Students have elementary knowledge about problems connected with environment hazards caused by transport.
2	Skills	Students can use gained knowledge to solve simple problems connected with defining influence of transport on the environment.
3	Social competencies	Students are self-reliant in solving problems, gaining and mastering knowledge and skills. Students are aware of importance and understand out of tech aspects and results of the influence of transport on the environment.
Assumptions and objectives of the course: The aim of the subject is to get students acquainted with elementary terms about environment protection, existing hazards stemming from operational use of rolling stock and necessary actions leading to reduction of negative influence of rail transport on the environment and people in the vehicles.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Students have elementary knowledge about selection of specialized device, measurement methods and interpretation of results of noise and vibration measurements in rail vehicles and in the environment. - [K2A_W17]		
2. Students have organized knowledge about defining effects of negative influence of rail means of transport on people and the environment. - [K2A_W22]		
Skills:		
1. Students can find information in literature, in the internet data bases and other sources in Polish and foreign language. - [K2A_U01]		
2. Students can communicate using various techniques in the professional environment and other environments using terms and definitions from environment protection. - [K2A_U02]		
Social competencies:		
1. Students are aware of necessity and know ways of continuous training, are ware of necessity to gain new knowledge for professional development. - [K2A_K01]		
2. Students are aware of responsibility for their work and are ready to comply with principles of cooperation in a team and to carry responsibility for jointly realized tasks. - [K2A_K02]		

Assessment methods of study outcomes		
Written exam		
Course description		
Introduction to questions of environment protection in transport, trends of rail transport development in Poland, characteristics of hazards caused in the environment by rail means of transport, identification of main sources of noise and vibrations in rail vehicles, measurement methods and criteria of assessing vibroacoustic effects in rail vehicles and their influence on people and the environment, methods of noise and vibration reduction in rail transport, selected problems of influence of dangerous goods transported by railway on the environment, modes of action in case of penetration of petroleum products into the ground.		
Basic bibliography:		
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.: Płyny eksploatacyjne do środków transportu drogowego. Charakterystyka funkcjonalna i ekologiczna. Wydawnictwo Politechniki Poznańskiej, Poznań 2006.		
Additional bibliography:		
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.		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation to the lecture	5	
2. Participation in the lecture	15	
3. Consolidation of the lecture content	8	
4. Consultation about lecture	3	
Student's workload		
Source of workload	hours	ECTS
Total workload	18	1
Contact hours	16	1
Practical activities	0	0