

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Vibrations and Noise in Transportation</b>		Code <b>1010622211010620380</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>1 / 1</b>
Elective path/specialty <b>Ecology of Transport</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>2</b> Classes: <b>-</b> Laboratory: <b>1</b> Project/seminars: <b>-</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Małgorzata Orczyk email: malgorzata.orczyk@put.poznan.pl tel. (61) 665 2017 Wydział Maszyn Roboczych i Transportu ul. Piotrowo 3, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Students have elementary knowledge about mathematics in elementary functions, differential calculus, integral calculus and elements of mathematical statistics. Students have elementary knowledge about physics in acoustics. Students have elementary knowledge about the influence of means of transport on the environment with special consideration of questions connected with vibroacoustics
2	<b>Skills</b>	Students can plan and realize simple measurement of noise and vibrations, interpret the results and draw conclusions. Students can define influence of vibroacoustic effects occurring in transport on the environment and people
3	<b>Social competencies</b>	Students can cooperate in a group taking various roles in it. 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
<b>Assumptions and objectives of the course:</b> The aim of the subject is to get students acquainted with theoretical and practical questions connected with generation, propagation and influence on people of noise and vibrations in means of transport and infrastructure connected with them. Students gain practical knowledge about application of specialized measurement equipment for registration of vibroacoustic signals and about methods of measurements and assessment of noise and vibrations in means of transport, in the environment and their influence on people.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Students have systematic knowledge gained on the basis of theory about acoustics and theory of mechanical vibrations - [K2A_W04]		
2. Students have elementary knowledge about metrology (know methods of arranging measurements, registering vibroacoustic signals) characteristics of measurement sensors and interpretation of results - [K2A_W17]		
3. Students have comprehensive knowledge about negative influence of vibroacoustic effects occurring in means of transport on the environment and people and about methods of their reduction - [K2A_W22]		
<b>Skills:</b>		
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 vibroacoustic domain - [K2A_U02]		
3. Students can plan and carry out research experiment using professional equipment for measuring noise and vibrations and interpret the results - [K2A_U07]		
4. Students can practically use computer office packages to create reports from research - [K2A_U17]		

<b>Social competencies:</b>
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]
3. Students are aware of relaying gained knowledge to society, make effort to make the relayed information comprehensible - [K2A_K08]

<b>Assessment methods of study outcomes</b>
Written exam, pass-fail test, reports from practices

<b>Course description</b>
Introduction to questions about acoustics and theory of mechanical vibrations, identification of main sources of noise and vibrations occurring in means of transport, influence of noise and vibrations on the environment and people and criteria of their assessment, review of effective law referring to influence of noise and vibrations in means of transport and in the environment, methods of measurement, analyses of vibroacoustic signals and ways of inference referring to questions about occurrence of noise and vibrations in means of transport and in the environment, methods of reducing noise and vibrations, methods of protecting people and surrounding against noise and vibrations occurring in transport.

<b>Basic bibliography:</b>
1. Cempel C.: Wibroakustyka stosowana. PWN, Warszawa 1989
2. Engel Z.: Ochrona środowiska przed drganiami i hałasem. Wydawnictwo Naukowe PWN, Warszawa 2001
3. Makarewicz R.: Hałas w środowisku. Ośrodek Wydawnictw Naukowych, Poznań 1996
4. Ciesielski R., Kawecki J., Maciąg E.: Ocena wpływu wibracji na budowę i ludzi w budynkach (diagnostyka dynamiczna). Instytut Techniki Budowlanej, Warszawa 1993

<b>Additional bibliography:</b>
1. Makarewicz R.: Dźwięk w środowisku. Ośrodek Wydawnictw Naukowych, Poznań 1994
2. Makarewicz R.: Wstęp do akustyki teoretycznej cz. 1. Wydawnictwo Naukowe UAM, Poznań 2005
3. Zakrzewski T., Żuchowski R.: Kompendium akustyki architektonicznej wraz z przykładami metod obliczeniowych. Wydawnictwo Politechniki Śląskiej, Gliwice 2009
4. Nader M.: Modelowanie i symulacja oddziaływania drgań pojazdów na organizm człowieka. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2001
5. Rogoziński R., Sadowski J.: Walka z hałasem w komunikacji i przemyśle. WKiŁ, Warszawa 1965

<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	75	3
Contact hours	51	2
Practical activities	24	1