

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Research on emissions in transportation</b>		Code <b>1010621261010622432</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>3 / 6</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>First-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 hab. inż. Jacek Pielecha email: jacek.pielecha@put.poznan.pl tel. 61-6652118 Faculty of Working Machines and Transportation ul. Piotrowo 3 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	the student has a basic knowledge in chemistry, thermodynamics and maths
2	<b>Skills</b>	student is able to read chemical equations and technical drawings related to construction of measuring devices
3	<b>Social competencies</b>	Understand the relationship between the construction and implementation of measuring devices
<b>Assumptions and objectives of the course:</b> Introduction to the carrying out the functional tests of combustion engines and exhaust emissions		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b>		
1. Has a basic and extended knowledge in the field of measurement engineering - [K1A_W16] 2. Has knowledge about the development trends and new developments in the field exhaust emission measurement methods of gas gaseous compounds and particulate matter - [K1A_W21] 3. Has a basic knowledge about the types and methods of research in the field of solving the basic engineering tasks, using modern measurement techniques and data acquisition for evaluation the environmental pollution from transport - [K1A_W24]		
<b>Skills:</b>		
1. Is able to use analytical and experimental methods for formulating and solving problems related to the methodology of environmental pollution measurements - [K1A_U07] 2. Is able to identify the research methods, interpret the results and draw conclusions in work related to environmental pollution measurements - [K1A_U08] 3. Is able to analyze and evaluate the functional properties of the existing test methods and measuring devices used in the environmental pollution measurements - [K1A_U10]		
<b>Social competencies:</b>		
1. Is aware of and understands the validity of the non-technical aspects and effects of engineering activities, including its impact on the environment, and has the responsibility for decisions - [K1A_K02] 2. Is able to creative and enterprising thinking and acting - [K1A_K07]		

<b>Assessment methods of study outcomes</b>		
Discussion with illustrative materials use, related with measurement of exhaust emission in transport tasks. The written exam		
<b>Course description</b>		
<p>Issues connected with control tests in European Union and Unated States of America. Control tests of vehicles in case of gaseous compounds exhaust emission. Road tests of cars and trucks equipped with SI and CI engines. Ability to assess fuel consumption using a two-dimensional probability density histograms. Rating emissivity of different propulsion systems including hybrid and start-stop systems Vehicle emission measurements during real operation, using a mobile analyzer (measurement of gaseous components and the particulates? Qualitative and quantitative assessment. Carrying out exhaust emission research from engines fueled with different types of fuels (gasoline, diesel, gas) on engine test beds. Determination of exhaust emission histograms defining operation conditions of vehicles and their engines. Determination of emissivity vehicle under different conditions of their work. Determination of brake specific emission from vehicles in different operating conditions. Determination of brake specific emission from vehicles in actual and future homologation tests. Evaluation of the exhaust emission from vehicles with different mileage. Methodology for vehicle exhaust emission assesment in real traffic conditions using data from the vehicle's diagnostic system</p>		
<b>Basic bibliography:</b>		
<ol style="list-style-type: none"> <li>Serdecki (red).: Badania silników spalinowych. Wydawnictwo Politechniki Poznańskiej, Poznań 2012</li> <li>Sher E., Handbook of Air Pollution from Internal Combustion Engines. Pollutant Formation and Control. Academic Press. Boston 1998</li> <li>Merkisz J., Ekologiczne problemy silników spalinowych. Tom I (1998), Tom II (1999), WPP, Poznań</li> <li>Merkisz J., Pielecha J., Radzimirski S., New Trends in Emission Control in the European Union. Springer Tracts on Transportation and Traffic, Vol. 1, 2014.</li> <li>Merkisz J., Pielecha J., Emisja cząstek stałych ze źródeł motoryzacyjnych. Wydawnictwo Politechniki Poznańskiej, Poznań 2014.</li> </ol>		
<b>Additional bibliography:</b>		
<ol style="list-style-type: none"> <li>Merkisz J., Mazurek S., Pielecha J., Pokładowe urządzenia rejestrujące w pojazdach, Wydawnictwo Politechniki Poznańskiej, Poznań 2007</li> <li>Merkisz J., Pielecha I., Alternatywne napędy pojazdów. Wydawnictwo Politechniki Poznańskiej, Poznań 2006</li> </ol>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Participation in the lecture	30	
2. Consulting	3	
3. Exam preparation	10	
4. Prepare for training auditorium	3	
5. Participation in exercises auditorium	8	
6. Participation in laboratory exercises	15	
7. Capturing the content of training / report	8	
8. Preparing to pass	8	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	85	3
Contact hours	51	2
Practical activities	34	1