

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Vehicle emissions measurement		Code 1010625331010622313
Field of study Transport	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 3
Elective path/specialty Ecology of Transport	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 18 Classes: - Laboratory: 9 Project/seminars: -		No. of credits 3
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 Technical sciences		ECTS distribution (number and %) 3 100% 3 100%
Responsible for subject / lecturer: prof. dr hab. inż. Jacek Pielecha, prof. nadzw. email: jacek.pielecha@put.poznan.pl tel. 61 665 2118 Faculty of Transport Engineering ul. Piotrowo 3 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	student has a basic knowledge of carrying out research and exhaust emission measurements
2	Skills	student is able to integrate the obtained information, to make their interpretation, draw conclusions, formulate and justify opinions
3	Social competencies	student is aware of the non-technical aspects and effects of transport activities
Assumptions and objectives of the course: Provide the basic information about the measurements of vehicles exhaust emission using the latest mobile solutions		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Has a basic knowledge concerning to the exhaust emission measurements from different types of vehicles - [[K2A_W17]]		
2. Has a basic knowledge about methods, techniques, tools and materials used for measuring exhaust emission from vehicles in real traffic conditions using mobile devices - [[K2A_W22]]		
3. Has a detailed knowledge about the types and methods of vehicles exhaust emission measurements - [K2A_W22]		
Skills:		
1. Is able to use the analytical and experimental methods for formulating and solving problems associated with vehicles exhaust emission measurements - [K2A_U01]		
2. Is able to identify and formulate the specification of complex engineering tasks specific to the vehicles exhaust emission measurements - [K2A_U10]		
3. Is able to propose exhaust emission indexes for specific vehicle measurement tests - [K2A_U18]		
4. Is able to plan and carry out experimental research in the field of vehicle exhaust emission measurements in real traffic conditions - [K2A_U07]		
Social competencies:		
1. Understands the need for continuous training? raising the professional and personal competences - [K2A_K01]		
2. Is able to creative and enterprising thinking and acting - [K2A_K07]		
3. Has a sense of responsibility for collaborative performed tasks related to teamwork - [K2A_K02]		

Assessment methods of study outcomes		
Discussion with illustrative materials use, related with exhaust vehicles emission testing. The written exam		
Course description		
<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>		
Basic bibliography:		
<ol style="list-style-type: none"> 1. Merksiz J., Pielecha J., Radzimirski S., Emisja zanieczyszczeń ze źródeł motoryzacyjnych w świetle nowych przepisów Unii Europejskiej. WKŁ, Warszawa 2012 2. Merksiz J., Pielecha J., Radzimirski S., Pragmatyczne podstawy ochrony powietrza atmosferycznego w transporcie drogowym. Wydawnictwo Politechniki Poznańskiej, Poznań 2009 3. Sher E., Handbook of Air Pollution from Internal Combustion Engines. Pollutant Formation and Control. Academic Press. Boston 1998 4. Szydlowski H. (red.), Teoria pomiarów. PWN, Warszawa 1981 5. Pielecha J., Identyfikacja parametrów cząstek stałych z silników spalinowych. Wyd. Politechniki Poznańskiej, Poznań 2012 6. Merksiz J., Pielecha J., Radzimirski S., New Trends in Emission Control in the European Union. Springer Tracts on Transportation and Traffic, Vol. 1, 2014. 7. Merksiz J., Pielecha J., Emisja cząstek stałych ze źródeł motoryzacyjnych. Wydawnictwo Politechniki Poznańskiej, Poznań 2014. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. Conference materials about exhaust emission measurements 		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lecture	18	
2. Consolidation on lecture	5	
3. Consultations	2	
4. Exam preparedness	5	
5. Participation in the exam	2	
6. Preparedness to laboratorries	8	
7. Participation in laboratories	9	
8. Consolidation of laboratories/Raport	8	
9. Participation in passing exam	8	
Student's workload		
Source of workload	hours	ECTS
Total workload	65	3
Contact hours	29	1
Practical activities	36	2