

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Ecological Aspects of Powertrains Application</b>		Code <b>1010621371010620377</b>
Field of study <b>Transport</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>4 / 7</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>1</b> Classes: <b>1</b> Laboratory: <b>-</b> Project/seminars: <b>1</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>4 100%</b> <b>4 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Mateusz Nowak email: mateusz.s.nowak@put.poznan.pl tel. 61 665-2252 Faculty of Transport Engineering ul. Piotrowo 3 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	student has a basic knowledge of the environmental factors causing danger to the environment, meets the mechanisms of toxic compounds in transport and industry, know how to prevent the entry of harmful substances into the atmosphere, meets the classification of harmful compounds to human health and the safety data sheets
2	<b>Skills</b>	student is able to integrate the information, make their interpretation, draw conclusions, formulate and justify opinions, have general knowledge of safety and environmental protection in the workplace
3	<b>Social competencies</b>	student is aware of the risks associated with the issue of harmful substances into the atmosphere and is aware of the negative environmental social behavior on health and human security in transport and industry
<b>Assumptions and objectives of the course:</b> refer to environmental issues in industry, general knowledge of the risks associated with human activities now and the possible effects on future hazard classification and their determination		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Has a structured and theoretically founded general knowledge in the field of key issues of technology and detailed knowledge in the field of selected guesses of this discipline of transport engineering - [T1A_W04] 2. has knowledge of important directions of development and the most important technical achievements and other related scientific disciplines, in particular transport engineering - [T1A_W05] 3. has basic knowledge about the life cycle of transport means, both hardware and software, and in particular about the key processes taking place in them - [T1A_W06]		
<b>Skills:</b> 1. Can acquire information from various sources, including literature and databases, both in Polish and English, appropriate to integrate them, make their interpretation and critical assessment, draw conclusions, and fully justify the opinions they formulate - [T1A_U01] 2. can, by formulating and solving tasks in the field of transport, apply properly selected methods, including analytical, simulation or experimental methods - [T1A_U04] 3. can see in the process of formulating and solving tasks in the field of transport engineering also non-transport aspects, in particular social, legal and economic issues - [T1A_U05]		
<b>Social competencies:</b>		

1. can think and act in an entrepreneurial way, including finding commercial applications for the system being created, bearing in mind not only business but also social benefits of the business - [T1A\_K03]
2. is aware of the social role of a technical university graduate, in particular, understands the need to formulate and communicate to the public, in an appropriate form, information and opinions on engineering activities, technical achievements, and the legacy and traditions of the profession of transport engineer - [T1A\_K04]

<b>Assessment methods of study outcomes</b>		
Test of knowledge of the formation of harmful compounds, structures standards toxicity of exhaust gases. One test during the semester		
<b>Course description</b>		
Lecture ? classification of propulsion systems, basic information of ecological transport, basic knowledge of exhaust gas cleaning systems, eco-friendly technologies in transport, the impact of macroeconomic factors on the implementation of environmentally friendly technologies in transport		
<b>Basic bibliography:</b>		
1. Stanisław Wiąckowski, Toksykologia środowiska człowieka. Wydawnictwo: Branta, 2010 ISBN: 978-83-616-6806-0		
2. Merkisz Jerzy, Mazurek Stanisław, Pokładowe Systemy Diagnostyczne Pojazdów Samochodowych. Wydawnictwa Komunikacji i Łączności WKŁ, 2006		
3. Jerzy Merkisz, Ekologiczne problemy silników spalinowych, Wyd. Politechniki Poznańskiej, Poznań 1998		
4. Merkisz J., Pielecha I., Alternatywne napędy pojazdów. Wydawnictwo Politechniki Poznańskiej, Poznań 2006.		
<b>Additional bibliography:</b>		
1. Wojciech Serdecki, Badania silników spalinowych. Wyd. Politechniki Poznańskiej, Poznań 2012		
2. Witold M. Lewandowski, Proekologiczne źródła energii odnawialnej. WNT, Warszawa 2002		
3. Zdzisław Chłopek, Ochrona środowiska naturalnego. Pojazdy samochodowe. WKŁ, Warszawa 2003		
4. Jan Gronowicz, Ochrona środowiska w transporcie lądowym. Wyd. ITE, Poznań ? Radom 2003		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Lecture	15	
2. Consultation	2	
3. Preparation for passing	5	
4. Participation in the pass	2	
5. Preparation for the auditorium exercises	15	
6. Participation in auditorium exercises	15	
7. Preservation of the content of exercises / report	8	
8. Preparation for project classes	15	
9. Project preparation	23	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	100	4
Contact hours	34	1
Practical activities	66	3