

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Environmental protection in transport		Code 1010601141010602093
Field of study Aerospace Engineering	Profile of study (general academic, practical) general academic	Year /Semester 2 / 4
Elective path/specialty Aircraft Transport	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: - Laboratory: 1 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
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. Jerzy Merkisz email: jerzy.merkisz@put.poznan.pl tel. 61 665 22 08 Faculty of Transport Engineering ul. Piotrowo 3, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	the student has a basic knowledge about the structure of the surrounding world and the laws that govern it
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 social and economic importance of environmental protection
Assumptions and objectives of the course: To familiarize students with the basic definitions of environmental protection and the main environmental hazards associated with the operation of the technical means of transport and possible remedial actions. Promoting environmental attitudes of students		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Knows the definitions in terms of environmental protection, ecology and related definitions - [[K1A_W24]] 2. Knows the structure of the biosphere and the properties of its individual components - [[K1A_W21]] 3. Knows the environmental hazards associated with the operation of the various transport sectors - [[K1A_W21]] 4. Knows the main principles connected with automotive emissions prevention - [[K1A_W24]] 5. Knows the basic legislation acts concerning to the environmental protection in Poland and the European Union - [[K1A_W20]]		
Skills:		
1. Is able to make a basic ecological evaluation of means of transport - [[K1A_U01]] 2. Is able to propose actions to alleviate the negative environmental impact of transport - [[K1A_U09]] 3. Is able to list and justify the ecological of development directions of transport systems and the environmental impact of the automotive industry - [[K1A_U02]]		
Social competencies:		
1. Has increased environmental awareness - [[K1A_K02]] 2. Is able to use the sustainable development principles in transport - [[K1A_K05]]		

Assessment methods of study outcomes		
Discussion during, current preparation and activity during classes. Mandatory individual reports after every laboratory. Exam which checks the knowledge in the area of environmental protection		
Course description		
Introduction to the environmental protection and ecology Basic environmental risks from the transport Influence of the consummables supplies using in transport on pollution from transport The mechanism of formation and methods for reducing exhaust emissions Exhaust gas aftertreatment Methods of measurements of exhaust emission and the emission standards The formation and reduction of noise and vibration in transport Additional actions in the transport for environmental protection Environmental hazards in the carriage of dangerous goods Recycling of vehicles and their assemblies and components Energy consumption in transport The influence of transportation on climate change Methods of environmental hazards evaluation in the field of transport The main assumptions of sustainable transport		
Basic bibliography:		
1. J. Gronowicz: Ochrona środowiska w transporcie lądowym. Wyd. Instytutu Technologii i Eksploatacji, Poznań ? Radom, 2003. 2. J. Merkisz: Ekologiczne Problemy silników spalinowych, Tom I i II. Wyd. Politechniki Poznańskiej, Poznań, 2000 3. J. Merkisz, J. Pielecha, S. Radzimirski: Pragmatyczne podstawy ochrony powietrza atmosferycznego w transporcie drogowym. Wyd. Politechniki Poznańskiej, Poznań, 2009		
Additional bibliography:		
1. B. Dobrzańska, G. Dobrzański, D. Kielczowski: Ochrona środowiska przyrodniczego. Wyd. Naukowe PWN, Warszawa 2008 2. S. Zięba: Historia myśli ekologicznej. Wyd. KUL, Lublin 2004		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	30	
2. Repetition of the material	5	
3. Office hours	3	
4. Preparation for the exam	3	
5. Participation in the exam	3	
6. Preparation for the laboratory exercises	8	
7. Participation in the laboratory exercises	15	
8. Repetition of the laboratory tasks/report	8	
9. Preparation for the final test	8	
Student's workload		
Source of workload	hours	ECTS
Total workload	75	3
Contact hours	51	2
Practical activities	24	1