STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Protection of Environment	**1010621271010620271**

Field of study	Profile of study (general academic, practical)	Year /Semester
Mechanical Engineering	**(brak)**	**4 / 7**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Internal Combustion Engines	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours						No. of credits
Lecture:	**1**	Classes:	**-**	Laboratory:	**1**	Project/seminars: **-**	**3**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	he has extensive knowledge related to environmental hazards, in particular caused by transportation
2	**Skills**	he can independently use various sources of information, including foreign languages. Can edit technical texts
3	**Social competencies**	student demonstrates a general understanding of the impact and identify hazardous to health compounds and methods of reducing them

Assumptions and objectives of the course:

The introduction of a student in environmental issues. To acquaint the student with the causes of emissions from different sources and components and devices which can limit the harmful components of exhaust in the transport and industry.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Identification of chemical compounds. - [K2A_W01]
2. Design and operation of aftertreatment systems. - [K2A_W20]

Skills:

1. The ability to identify the type of devices that reduce emissions and identification of damage. - [K2A_U02]
2. The ability to quantify the emissions of harmful exhaust gases emitted into the atmosphere transport. - [K2A_U09]
3. The ability to identify the initial symptoms of poisoning individual chemical compounds. - [K2A_U16]

Social competencies:

1. Understanding for learning through all life. - [K2A_K01]
2. Is aware of and understands the validity of the non-technical aspects and effects of engineering activities. - [K2A_K02]
3. Student able to set priorities for implementing the tasks undertaken. - [K2A_K04]

Assessment methods of study outcomes

Discussion, combined with the merits of the effectiveness of the equipment and components of transport in the reduction of harmful emissions. Rating sample test experiment.

Course description

Aftertreatment systems. The on-board diagnostics OBD. The provisions of the toxicity of exhaust gases. Alternative Fuels. Alternative drives.

Basic bibliography:

1. Edyta Zielińska, Kazimierz Lejda, Analiza i modelowanie procesów logistycznych w zapleczu technicznym transportu samochodowego w aspekcie problemów ekologicznych. ISBN: 978-83-7199-597-2.
2. Stanisław Wiąckowski, Toksykologia środowiska człowieka. Wydawnictwo: Branta, 2010 ISBN: 978-83-616-6806-0.
3. Merkisz Jerzy, Mazurek Stanisław, Pokładowe Systemy Diagnostyczne Pojazdów Samochodowych. Wydawnictwa Komunikacji i Łączności WKŁ, 2006-01-01.
4. Merkisz J., Pielecha I., Alternatywne napędy pojazdów. Wydawnictwo Politechniki Poznańskiej, Poznań 2006.

Additional bibliography:

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.

Result of average student's workload

Activity	Time (working hours)
1. Prepare to the class	5
2. Activity	15
3. Knowledge	8
4. Labour	15
5. Prepare to the test	10
6. Test activity	2

Student's workload

Source of workload	hours	ECTS
Total workload	55	3
Contact hours	39	2
Practical activities	16	1