



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Ecological aspects apply of combustion powertrains II [N2Trans1-TrN>EASSUN2]

### Course

Field of study

Transport

Year/Semester

1/1

Area of study (specialization)

Low-emission Transport

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

### Number of hours

Lecture

18

Laboratory classes

0

Other

0

Tutorials

9

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

dr hab. inż. Andrzej Ziółkowski prof. PP  
andrzej.j.ziolkowski@put.poznan.pl

### Lecturers

### Prerequisites

Knowledge: the student has a basic knowledge of the impact of vehicle operation on the natural environment, exhaust gas toxicity regulations and methods of reducing the negative impact of transport on the environment. Skills: the student is able to integrate the obtained information, interpret it, draw conclusions, formulate and justify opinions. Social competences: the student is aware of the importance and understands the technical aspects and effects of vehicle operation.

### Course objective

Getting to know the subject of ecology in transport, general knowledge of methods of measuring emissions from vehicles of various categories, general knowledge of alternative propulsion sources.

### Course-related learning outcomes

Knowledge:

1. Has ordered and theoretically founded general knowledge related to key issues in the field of transport engineering - [T2A\_W02]
2. Has knowledge of development trends and the most important new achievements of means of transport and other selected related scientific disciplines - [T2A\_W04]

3. Knows advanced methods, techniques and tools used in solving complex engineering tasks and conducting research in a selected area of transport - [T2A\_W06]

#### Skills:

1. Can use information and communication techniques used in the implementation of projects in the field of transport - [T2A\_U02]
2. Can plan and conduct experiments, including measurements and simulations, interpret the obtained results and draw conclusions, as well as formulate and verify hypotheses related to complex engineering problems and simple research problems - [T2A\_U03]
3. Can, when formulating and solving engineering tasks, integrate knowledge from various areas of transport (and, if necessary, knowledge from other scientific disciplines) and apply a systemic approach, also taking into account non-technical aspects - [T2A\_U05]

#### Social competences:

1. Understands the importance of using the latest knowledge in the field of transport engineering in solving research and practical problems - [T2A\_K02]
2. Understands the importance of popularizing activities concerning the latest achievements in the field of transport engineering - [T2A\_K03]
3. Is aware of the need to develop professional achievements and observe the rules of professional ethics - [T2A\_K04]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Discussion, combined with the assessment of exemplary implementation of engineering diploma theses. Credit based on a study containing basic information on the student's engineering diploma thesis.

### Programme content

Lecture: environmental conditions in transport; natural resources, social and economic factors; vehicle classification, exhaust gas toxicity standards

Exercises: calculating fuel consumption, emissions in stationary and road tests, unit emissions.

### Course topics

none

### Teaching methods

1. Lecture with multimedia presentation
2. Exercises - solving problems

### Bibliography

Basic

1. Torsten Schmidt: Pojazdy hybrydowe i elektryczne w praktyce warsztatowej. Wydawnictwa Komunikacji i Łączności WKŁ, 2019.
2. Jerzy Merkiś, Paweł Fuć, Piotr Lijewski, Fizykochemiczne aspekty budowy i eksploatacji filtrów cząstek stałych. Poznań 2016.
3. Jerzy Merkiś, Ekologiczne problemy silników spalinowych, Wyd. Politechniki Poznańskiej, Poznań 1998
4. Uwe Rokosch, Układy oczyszczania spalin i pokładowe systemy diagnostyczne samochodów. ISBN 978-83-206-1657-6.

Additional

### Breakdown of average student's workload

	Hours	ECTS
Total workload	60	3,00
Classes requiring direct contact with the teacher	27	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	33	1,00