



COURSE DESCRIPTION CARD - SYLLABUS

Course name

PO: Ecological aspects of vehicle operation - The impact of vehicle operation on the environment

Course

Field of study

Electromobility

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

polish

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

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Faculty of Civil and Transport Engineering

Piotrowo 3 street, 60-965 Poznan

Responsible for the course/lecturer:

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Prerequisites

The student starting this course should have basic knowledge of mathematics, physics and mechanics.

Course objective

Expanding student's knowledge on the impact of vehicle operation on the surrounding environment. Discussion of compounds emitted into the atmosphere during the use of vehicles and their impact on the environment and the people. Introducing the current emission limits and discussing their historical background. Understanding ways to reduce emissions from new and in-use vehicles. Comparison of emissions depending on the vehicle's drivetrain system and its intended use, as well as operating conditions.



Course-related learning outcomes

Knowledge

1. Has knowledge of pollutant emission measurement methods.
2. Has knowledge of the causes of the formation of exhaust toxic compounds.
3. Has knowledge of how to reduce exhaust emissions.

Skills

1. Ability to discuss the operation of engine exhaust gas cleaning.
2. Ability to use and acquired knowledge to discuss the impact of vehicle operation on the environment.

Social competences

Students understand how the operation of vehicles affects the environment

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: the knowledge acquired during the lecture is verified during a written exam during the exam session. The exam consists of open questions, score depend on the difficulty level. Passing threshold: 50% of the total number of points. Exam issues are sent to the head of the year by e-mail using distribution lists 3 weeks before the exam date and discussed during the last lecture.

Programme content

Gaseous toxic components from conventional propulsion systems - discussion of the causes of formation, impact on living organisms and methods of reducing them. Change in exhaust emissions trends in recent years, historical outline of Euro standards. Overview of individual engine exhaust gas treatment systems for conventional drives and hybrid drive systems. Non-engine emission of solid particles near the engine - the essence of the problem (nanoparticles from brake system and tires), methods of its reduction. Ecological methods of generating electricity for vehicles - the use of bio-waste and renewable energy. Energy flow and losses in conventional, hybrid and electric drive systems.

Teaching methods

Lecture: multimedia presentation (including: drawings, photos, animations, films). Taking into account various aspects of the presented issues, including: economic, ecological, legal and social. Presenting a new topic preceded by a reminder of last related content, known to students from other subjects.

Bibliography

Basic

1. Merkisz J., Fuć P., Lijewski P., Fyzykochemiczne aspekty budowy i eksploatacji filtrów cząstek stałych, Wydawnictwo Politechniki Poznańskiej, Poznań 2016.
2. Praca zbiorowa pod redakcją Jacka Pielechy, Badania emisji zanieczyszczeń silników spalinowych, Wydawnictwo Politechniki Poznańskiej, Poznań 2017.



3. REGULATION (EC) No 715/2007 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 June 2007 on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information.

Additional

1. Regulation No 101 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of passenger cars powered by an internal combustion engine only, or powered by a hybrid electric power train with regard to the measurement of the emission of carbon dioxide and fuel consumption and/or the measurement of electric energy consumption and electric range, and of categories M1 and N1 vehicles powered by an electric power train only with regard to the measurement of electric energy consumption and electric range

Breakdown of average student's workload

| | Hours | ECTS |
|---|-------|------|
| Total workload | 25 | 1,0 |
| Classes requiring direct contact with the teacher | 15 | 0,5 |
| Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹ | 10 | 0,5 |

¹ delete or add other activities as appropriate