



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Emissions measurement methodology

### Course

Field of study

Year/Semester

Transport

1/2

Area of study (specialization)

Profile of study

Low-emission transport

general academic

Level of study

Course offered in

Second-cycle studies

Polish

Form of study

Requirements

full-time

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

15

0

Tutorials

Projects/seminars

0

0

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

prof. dr hab. inż. Jacek Pielecha

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Faculty of Civil and Transport Engineering

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### Prerequisites

Knowledge: student has a basic knowledge of carrying out research and technical objects measurements

Skills: student is able to integrate the obtained information, to make their interpretation, draw conclusions, formulate and justify opinions

Social competencies: student is aware of the non-technical aspects and effects of transport activities

### Course objective

Introduction to the methodology of functional properties in transport pollutants and exhaust emissions testing



### Course-related learning outcomes

#### Knowledge

The student has an ordered and theoretically founded general knowledge related to key issues in the field of transport engineering.

The student knows the development trends and the most important new achievements of means of transport and other selected related scientific disciplines.

The student knows advanced methods, techniques and tools used in solving complex engineering tasks and conducting research in a selected area of transport.

#### Skills

The student is able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems.

The student is able to assess the usefulness and the possibility of using new achievements (methods and tools) and new products of transport technology.

The student is able - using, among others conceptually new methods - solve complex tasks in the field of transport engineering, including atypical tasks and tasks with a research component.

The student will be able to work in a team, assuming various roles in it.

#### Social competences

The student understands that in the field of transport engineering, knowledge and skills very quickly become obsolete.

The student understands the importance of using the latest knowledge in the field of transport engineering in solving research and practice problems.

The student understands the importance of popularizing activities regarding the latest achievements in the field of transport engineering.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Discussion with illustrative materials use, related with measurement of exhaust emission in transport tasks. The written exam

### Programme content

Methods for measuring toxic compounds in the exhaust gas (analyzers: NDIR, FID, CLD, MPD, elements chromatography; measurement of solid particles, opacimeters). Standards and methods of testing the emissions of compounds toxic; tests of vehicles with a total mass of less than and over 3500 kg, tests of engines of another application of non-automotive standards, forecasts of development of standards and methods of research Polish legislation concerning the emission of pollutants. Determination of typical characteristics of engines. Measurement methods pollution in the drives of road, rail and sea transport units. The basics unconventional research methods (fast photography, VIDEO technique, emission and



absorption techniques, laser, etc.). Measurement methods used in static tests. Test methodology research intended for dynamic research. Methodology of pollution measurements in real traffic conditions. Construction and operation of mobile analyzers for measurement gaseous compounds and solid particles (in terms of mass, number and diameter distribution).

### Teaching methods

seminar lecture / lecture with multimedia presentation, laboratory

### Bibliography

#### Basic

1. Pielecha J. (red.), Badania emisji zanieczyszczeń silników spalinowych. Wydawnictwo Politechniki Poznańskiej, Poznań 2017.
2. Merkisz J., Pielecha J., Radzimirski S., New Trends in Emission Control in the European Union. Springer Tracts on Transportation and Traffic, Vol. 1, 2014.
3. Merkisz J. Fuć P., Pielecha J., Metody pomiaru emisji związków szkodliwych spalin w rzeczywistych warunkach ruchu pojazdów samochodowych. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa–Poznań 2014.

#### Additional

1. Merkisz J., Pielecha I., Alternatywne napędy pojazdów. Wydawnictwo Politechniki Poznańskiej, Poznań 2006.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	95	4,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	50	2,0

<sup>1</sup> delete or add other activities as appropriate