



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Emissions measurement methodology

### Course

Field of study

Year/Semester

Transport

1/1

Area of study (specialization)

Profile of study

Sustainable transport

general academic

Level of study

Course offered in

Second-cycle studies

English

Form of study

Requirements

full-time

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

15

Tutorials

Projects/seminars

### Number of credit points

1

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

prof. dr inż. Paweł Fuć

Faculty of Civil and Transport Engineering

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Powertrains

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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

Student has extended knowledge in the field of pollution in different operation conditions of machinery

Student has knowledge about the development trends and new developments in the field exhaust emission measurement methods of gas gaseous compounds and particulate matter

Student has detailed knowledge about the types and methods of research in the field of working machines using modern measurement techniques and data acquisition

#### Skills

Student is able to use analytical and experimental methods for formulating and solving problems related to the methodology of environmental pollution measurements

Student is able to identify the research methods, interpret the results and draw conclusions in work related to environmental pollution measurements

Student is able to analyze and evaluate the functional properties of the existing test methods and measuring devices used in the environmental pollution measurements

Student is able to plan and carry out experimental studies on the environmental pollutants measurements

#### Social competences

Student understands the need for continuous training- raising the professional and personal competences

Student is able to creative and enterprising thinking and acting

Student has a sense of responsibility for collaborative performed tasks related to teamwork

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Discussion with illustrative materials use related to measurement of exhaust emission in transport and written final exam.

### Programme content

Methods for measuring toxic compounds in the exhaust gas. 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. 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.



## Teaching methods

Lecture with multimedia presentation and seminar lecture

## Bibliography

### Basic

1. Merkisz J., Pielecha J., Radzimirski S., New Trends in Emission Control in the European Union. Springer Tracts on Transportation and Traffic, Vol. 1, 2014.

### Additional

1. Pielecha I., Pielecha J., Simulation analysis of electric vehicles energy consumption in driving tests. *Eksploatacja i Niezawodność – Maintenance and Reliability* 2020, 22(1), 130-137
2. Pielecha J., Gis M., The use of the mild hybrid system in vehicles with regard to exhaust emissions and their environmental impact. *Archives of transport*, 2020, 55(3), 41-50
5. Merkisz J., Pielecha J., Bielaczyc P., Woodburn J., Szalek A., A Comparison of Tailpipe Gaseous Emissions from the RDE and WLTP Test Procedures on a Hybrid Passenger Car. SAE Technical Paper 2020-01-2217, 2020

## 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 exam) <sup>1</sup>	10	0,5

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