



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Vehicle emissions measurement [S2Trans1-TrN>PEP]

### Course

Field of study

Transport

Year/Semester

2/3

Area of study (specialization)

Low-emission Transport

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

prof. dr hab. inż. Jacek Pielecha  
jacek.pielecha@put.poznan.pl

### Lecturers

### Prerequisites

Knowledge: student has a basic knowledge of carrying out research and exhaust emission 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

Provide the basic information about the measurements of vehicles exhaust emission using the latest mobile solutions

### Course-related learning outcomes

Knowledge:

1. Has a basic knowledge concerning to the exhaust emission measurements from different types of vehicles
2. Has a basic knowledge about methods, techniques, tools and materials used for measuring exhaust emission from vehicles in real traffic conditions using mobile devices
3. Has a detailed knowledge about the types and methods of vehicles exhaust emission measurements

#### Skills:

1. Is able to use the analytical and experimental methods for formulating and solving problems associated with vehicles exhaust emission measurements
2. Is able to identify and formulate the specification of complex engineering tasks specific to the vehicles exhaust emission measurements
3. Is able to propose exhaust emission indexes for specific vehicle measurement tests
4. Is able to plan and carry out experimental research in the field of vehicle exhaust emission measurements in real traffic conditions

#### Social competences:

1. Understands the need for continuous training(raising the professional and personal competences
2. Is able to creative and enterprising thinking and acting
3. 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:

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

#### Programme content

Issues connected with control tests in European Union and United States of America. Control tests of vehicles in case of gaseous compounds exhaust emission. Road tests of cars and trucks equipped with SI and CI engines. Ability to assess fuel consumption using a two-dimensional probability density histograms. Rating emissivity of different propulsion systems including hybrid and start-stop systems. Vehicle emission measurements during real operation, using a mobile analyzer (measurement of gaseous components and the particulates? Qualitative and quantitative assessment. Carrying out exhaust emission research from engines fueled with different types of fuels (gasoline, diesel, gas) on engine test beds. Determination of exhaust emission histograms defining operation conditions of vehicles and their engines. Determination of emissivity vehicle under different conditions of their work. Determination of brake specific emission from vehicles in different operating conditions. Determination of brake specific emission from vehicles in actual and future homologation tests. Evaluation of the exhaust emission from vehicles with different mileage. Methodology for vehicle exhaust emission assessment in real traffic conditions using data from the vehicle's diagnostic system

#### Course topics

none

#### Teaching methods

seminar lecture / lecture with multimedia presentation, laboratory

#### Bibliography

Basic

1. Merkisz J., Pielecha J., Radzimirski S., Emisja zanieczyszczeń ze źródeł motoryzacyjnych w świetle nowych przepisów Unii Europejskiej. WKŁ, Warszawa 2012.
2. Merkisz J., Pielecha J., Radzimirski S., Pragmatyczne podstawy ochrony powietrza atmosferycznego w transporcie drogowym. Wydawnictwo Politechniki Poznańskiej, Poznań 2009.
3. Sher E. Handbook of Air Pollution from Internal Combustion Engines. Pollutant Formation and Control. Academic Press. Boston 1998.
4. Szydlowski H. (red.) Teoria pomiarów. PWN, Warszawa 1981.
5. Pielecha J., Identyfikacja parametrów cząstek stałych z silników spalinowych. Wyd. Politechniki Poznańskiej, Poznań 2012.
6. Merkisz J., Pielecha J., Radzimirski S., New Trends in Emission Control in the European Union. Springer Tracts on Transportation and Traffic, Vol. 1, 2014.
7. Merkisz J., Pielecha J., Emisja cząstek stałych ze źródeł motoryzacyjnych. Wydawnictwo Politechniki

Poznańskiej, Poznań 2014.

8. Pielecha J. (red.), Badania emisji zanieczyszczeń silników spalinowych. Wydawnictwo Politechniki Poznańskiej, Poznań 2017.

Additional

### Breakdown of average student's workload

	Hours	ECTS
Total workload	77	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	32	1,00