# STUDY MODULE DESCRIPTION FORM

| Name of the module/subject | | Code |
|---|---|---|
| **Emissions measurement methodology** | | **1010622321010622311** |
| Field of study: **Transport** | Profile of study (general academic, practical): **(brak)** | Year /Semester: **1 / 2** |
| Elective path/specialty: **Ecology of Transport** | Subject offered in: **Polish** | Course (compulsory, elective): **obligatory** |
| Cycle of study: **Second-cycle studies** | Form of study (full-time,part-time): **full-time** | |
| No. of hours: Lecture: **2** Classes: **-** Laboratory: **1** Project/seminars: **-** | | No. of credits: **4** |
| Status of the course in the study program (Basic, major, other): **(brak)** | (university-wide, from another field): **(brak)** | |
| Education areas and fields of science and art: **technical sciences** **Technical sciences** | | ECTS distribution (number and %): **4 100%** **4 100%** |

## Responsible for subject / lecturer:

prof. dr hab. inż. Jacek Pielecha, prof. nadzw.
email: jacek.pielecha@put.poznan.pl
tel. 61 665 2118
Faculty of Transport Engineering
ul. Piotrowo 3 60-965 Poznań

## Prerequisites in terms of knowledge, skills and social competencies:

| | | |
|---|---|---|
| 1 | **Knowledge** | student has a basic knowledge of carrying out research and technical objects measurements |
| 2 | **Skills** | student is able to integrate the obtained information, to make their interpretation, draw conclusions, formulate and justify opinions |
| 3 | **Social competencies** | student is aware of the non-technical aspects and effects of transport activities |

## Assumptions and objectives of the course:

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

## Study outcomes and reference to the educational results for a field of study

### Knowledge:

1. Has extended knowledge in the field of pollution in different operation conditions of machinery - [K2A_W22]
2. Has knowledge about the development trends and new developments in the field exhaust emission measurement methods of gas gaseous compounds and particulate matter - [K2A_W22]
3. Has detailed knowledge about the types and methods of research in the field of working machines using modern measurement techniques and data acquisition - [K2A_W17]

### Skills:

1. Is able to use analytical and experimental methods for formulating and solving problems related to the methodology of environmental pollution measurements - [K2A_K01]
2. Is able to identify the research methods, interpret the results and draw conclusions in work related to environmental pollution measurements - [K2A_U16]
3. Is able to analyze and evaluate the functional properties of the existing test methods and measuring devices used in the environmental pollution measurements - [K2A_U10]
4. Is able to plan and carry out experimental studies on the environmental pollutants measurements - [K2A_U07]

### Social competencies:

1. Understands the need for continuous training? raising the professional and personal competences - [K2A_K01]
2. Is able to creative and enterprising thinking and acting - [K2A_K07]
3. Has a sense of responsibility for collaborative performed tasks related to teamwork - [K2A_K02]

## Assessment methods of study outcomes

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

## Course description

Issues connected with control tests in European Union and Unated 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 assessement in real traffic conditions using data from the vehicle's diagnostic system.

## Basic bibliography:

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

2. Merkisz J., Pielecha J., Radzimirski S., Pragmatyczne podstawy ochrony powietrza atmosferycznego w transporcie drogowym. Wydawnictwo Politechniki Poznańskiej, Poznań 2009.

3. Merkisz J., Pielecha J., Radzimirski S., Emisja zanieczyszczeń ze źródeł motoryzacyjnych w świetle nowych przepisów Unii Europejskiej. WKŁ, Warszawa 2012.

4. Merkisz J., Mazurek S., Pielecha J., Pokładowe urządzenia rejestrujące w pojazdach, Wydawnictwo Politechniki Poznańskiej, Poznań 2007.

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

## Additional bibliography:

1. Materiały konferencyjne dotyczące pomiarów toksyczności spalin

## Result of average student's workload

| Activity | Time (working hours) |
|---|---|
| 1. Participation in lecture | 30 |
| 2. Consolidation on lecture | 5 |
| 3. Consultations | 3 |
| 4. Exam preparedness | 3 |
| 5. Participation in the exam | 3 |
| 6. Preparedness to laboratorries | 8 |
| 7. Participation in laboratories | 15 |
| 8. Consolidation of laboratories/Raport | 8 |
| 9. Participation in passing exam | 8 |

## Student's workload

| Source of workload | hours | ECTS |
|---|---|---|
| Total workload | 97 | 4 |
| Contact hours | 47 | 2 |
| Practical activities | 50 | 2 |