COURSE DESCRIPTION CARD - SYLLABUS

Course name
Environmental Protection [N1MiBP1>OŚ]

Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
18

Laboratory classes
9

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr hab. inż. Łukasz Rymaniak prof. PP
lukasz.rymaniak@put.poznan.pl

Lecturers

Prerequisites

Knowledge: Basic knowledge of the operation of engines and drive systems of vehicles / machines. Basic knowledge of chemistry from high school. Skills: Logical thinking, learning comprehension, using textbooks and searching for information from scientific publications. Social competence: Awareness of the need to acquire knowledge and use it in various fields of technical and natural sciences.

Course objective

The aim of the course is to learn about the issues related to the impact of automotive industry on the environment, with particular emphasis on drive systems, exhaust gas treatment systems and alternative solutions.

Course-related learning outcomes

Knowledge:
Has elementary knowledge of automation systems, microcontrollers, control algorithms, automatic machines and industrial robots, electronic navigation systems used in machines and wired and wireless communication systems in local computer networks used in machines.
Is aware of the latest trends in machine construction, i.e. automation and mechatronization, automation

of machine design and construction processes, increased safety and comfort of operation, the use of modern construction materials.
Has extended basic knowledge necessary to understand specialist subjects and specialist knowledge about the construction, construction methods, manufacturing and operation of a selected group of working, transport, thermal and flow machines covered by the diploma path.
Has elementary knowledge of the impact of machinery and technology on the natural environment and global energy balances.

Skills:
Can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions.
Can properly use modern equipment for measuring major physical quantities, used in machine research and production control.

Social competences:
Is ready to critically assess his knowledge and received content
Is ready to fulfill social obligations and co-organize activities for the benefit of the social environment.
Is ready to fulfill professional roles responsibly, including:
- observing the rules of professional ethics and requiring this from others,
- caring for the achievements and traditions of the profession.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Assessment on the basis of a written test carried out in the last class.

Programme content

The following issues will be presented in the program content:
- Design solutions used in engines to reduce the emission of toxic compounds, divided into compression ignition and spark ignition engines,
- The impact of the operation of machines and vehicles with internal combustion engines on the emission of toxic compounds based on the preparation of the characteristics of the share of working time and emission histograms,
- Exhaust gas treatment systems in modern drive systems, broken down by engine type and fuel system type,
-Direction of development of alternative drive systems in terms of environmental protection.

Course topics

The topics of the course include:
-Historical and current engine and non-engine structures used to reduce gaseous emissions from motor vehicles;
-Historical and current engine and non-engine designs to reduce particulate emissions from motor vehicles;
-Construction of emission histograms and time density characteristics;
-Operational dependencies and pollutant emissions;
-Exhaust gas aftertreatment systems and their interaction;
-Development of engine drive systems.

Teaching methods

1. Lecture with multimedia presentation
2. Laboratories - problem solving

Bibliography

Basic
1. Serdecki W. (red.): Badania silników spalinowych - Laboratorium (Combustion engine research - Laboratory). WPP, Poznan, 2012 or later releases.
2. Rokosch U., Kałużny J.: Układy oczyszczania spalin i pokładowe systemy diagnostyczne samochodów

(Exhaust gas treatment systems and car on-board diagnostic systems). WKŁ, Warsaw 2016.
3. Merkisz J.: Ekologiczne problemy silników spalinowych (tom I i tom II) (Ecological problems of internal combustion engines (volume I and volume II)). WPP, Poznań, 1998.
4. Merkisz J., Pielecha J., Radzimirski S.: Pragmatyczne podstawy ochrony powietrza atmosferycznego w transporcie drogowym (Pragmatic basics of air protection in road transport). WPP, Poznań, 2009.
Additional
1. Engine manufacturer materials, conference and industry materials: Combustion Engines, MTZ, SAE.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	27	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	48	2,00