# COURSE DESCRIPTION CARD - SYLLABUS

Course name
On-board diagnostic systems [S2MiBP1-HSN>PSD]

## Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
2/3

Area of study (specialization)
Hybrid Powertrain Systems

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
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

## Number of credit points

2,00

## Coordinators

dr hab. inż. Marek Waligórski prof. PP
marek.waligorski@put.poznan.pl

## Lecturers

## Prerequisites

Knowledge: Has knowledge of: the process of diagnosing motor vehicles in terms of diagnostics of technical processes and objects, types of diagnostics and methods of diagnostic analysis, interdependencies occurring during the diagnosis of systems and physical quantities and tools included in the research process. Has knowledge of the analysis of signals obtained from various sources of processes located in the vehicle. The student knows the possibilities of analyzing measurement signals depending on the field of research assessment adopted.

## Course objective

Detailed knowledge and analysis of problems related to on-board diagnostic systems used in motor vehicles, taking into account the problems of using various sources of vehicle propulsion and strategies for controlling their operation. Thus, the objectives of this subject include not only the analysis of on- board diagnostic systems used in classic combustion engines, but also the implementation of OBD systems for alternative drives. skills in the field of diagnostics of technical processes and objects. Can build a simple vehicle diagnosis system based on the knowledge acquired within the subject in the field of construction, operating principles of systems and procedures for diagnosis and control. Can use the knowledge obtained in the analysis of a specific case of diagnosing a vehicle component under the OBD diagnostic procedure. group, assuming different roles in it. The student is able to define priorities important in solving the tasks set before him. The student demonstrates independence in solving problems, acquiring and improving the acquired knowledge and skills.

## Course-related learning outcomes

Knowledge:
Has a basic knowledge of quality management systems.
Has extensive knowledge of selected departments of technical mechanics related to the selected specialization.
Has basic knowledge about selected technologies of machine works in agriculture, construction, transport, food industry, etc.

Skills:
He can correctly select the optimal material and its processing technology for typical parts of working machines, taking into account the latest achievements in material engineering.
Can use a popular numerical system to program a simple system simulation task with a small number of degrees of freedom.
Can write a simple computer program with the use of modern RAD environments in a language known to him for the optimization calculations of structures using learned elementary numerical methods.

Social competences:
He is ready to critically assess his knowledge and received content.
Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.
It is ready to fulfill social obligations, inspire and organize activities for the benefit of the social environment.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
The learning outcomes presented above are verified as follows: Final test

## Programme content

Introduction to diagnostics of technical processes and objects. Division of diagnostics from the point of view of the life phases of a technical object and the purposes of its application. Analysis of interdependencies in the diagnosis process, evaluation of the sources and value of diagnostic information and diagnostic parameters, the genesis of the choice of the method of diagnosis and the location of measurement of the quantity carrying information about the process and technical condition of the object, diagnostic signals and symptoms (biomechanical approach), cause and effect relations between the condition of the object and the signal , diagnostic algorithms and process generation models, techniques for analyzing diagnostic signals. An introduction to on-board diagnostics of vehicles, including the purposes of its application, legal and technical requirements, design features and areas of application of on-board vehicle diagnostics. Legal regulations, technical standards and emissions of harmful components, and OBD on-board diagnostics. Division of vehicle diagnostic systems. Construction of OBD systems with regard to their next generations. Operation of the on-board diagnostic system (OBD), taking into account the classification of emission elements, diagnostic tests and their types. Rules for placing emission elements and decision strategies. Characteristics of OBD system diagnostic tests, diagnostic information and communication. Properties of diagnostic

information readers in OBD II / EOBD systems. Components of OBD systems and their characteristics. The types of ICT systems used in various OBD systems from the point of view of the communication strategy in the system and the processing of diagnostic data and the possibility of their development in future vehicle information network communication architectures. Analysis of diagnostic data obtained from the OBD system and decision-making procedures. Maintenance and repair of vehicles equipped with OBD systems

## Teaching methods

1. Lecture with multimedia presentation
2. Problem solving with the participation of students (problem, case and simulation method)
3. Elements of discussions and practice-practical methods

## Bibliography

Basic
1. Ecological problems of internal combustion engines. Vol. 1 i 2 / Jerzy Merkisz; Poznan University of Technology. Publish. PP, 1999.
2. On-board diagnostic systems of motor vehicles / Jerzy Merkisz, Stanisław Mazurek> WKiŁ 2002.
3. Thermal state of the internal combustion engine and the emission of harmful compounds / Piotr Bielaczyc, JerzyMerkisz, Jacek Pielecha. Publish. Poznań University of Technology, 2001.
4. On-board diagnostic systems of motor vehicles / Jerzy Merkisz, Stanisław Mazurek. Communication and Communications Publishing House, 2004
5. Alternative vehicle drives / Jerzy Merkisz, Ireneusz Pielecha. Publishing House of the Poznań University of Technology, 2006.
6. On-board diagnostic systems of motor vehicles / Jerzy Merkisz, Stanisław Mazurek. Communication and Communications Publishing House, 2007.
7. Pragmatic basics of atmospheric air protection in road transport / Jerzy Merkisz, Jacek Pielecha, Stanisław Radzimirski. Publishing House of the Poznań University of Technology, 2009.
8. Automotive emissions in the light of new EU regulations / Jerzy Merkisz, Jacek Pielecha, Stanisław Radzimirski. Communication and Communications Publishing House, 2012.
9. On-board recording devices in cars / Jerzy Merkisz, Stanisław Mazurek, Jacek Pielecha. Publishing House of the Poznań University of Technology, 2007.
10. Exhaust gas treatment systems and OBD vehicle diagnostic systems. Uwe Rokosch, WKiŁ 2007.
Additional
1. Bench tests and diagnostics. Kazimierz Sitek, Stanisław Syta, WKiŁ 2011.
2. Diagnostics of passenger cars. Krzysztof Trzeciak, WKiŁ 2010.
3. On-board diagnostics. OBD II / EOBD standard - service manual. Stefan Myszkowski.
4. Data exchange buses in vehicles. Protocols and standards. W. Zimmermann, R. Schmidgall. WKiŁ.
5. Vehicle data buses. Martin Frei. WKiŁ.

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 30 | 2,00 |
| Classes requiring direct contact with the teacher | 18 | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 12 | 1,00 |