COURSE DESCRIPTION CARD - SYLLABUS

Course name
Methods of Inferences in Vehicle Diagnostics [N2MiBP1-PSz>MiWwDP]

Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
1/1

Area of study (specialization)
Railway Vehicles

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
9

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
9

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

KNOWLEDGE: Basic knowledge of physics, mechanics and vehicle construction. SKILLS: Solve problems appearing in technical systems. SOCIAL COMPETENCES: Collaboration in a group and setting priorities in solving the tasks set before him.

Course objective

Getting to know theoretical and practical issues related to the methods and diagnostic inference in vehicles.

Course-related learning outcomes

Knowledge:
Has a general knowledge of the types of research and methods of testing working machines with the use of modern measurement techniques and data acquisition.
Has extended knowledge of the standards for working machines in the field of methods of calculating and testing machines, safety, including road safety, environmental protection as well as mechanical and electrical interface.
Has extended knowledge of the life cycle of machines, the principles of operation of working machines and destructive processes occurring during operation, such as tribological wear, corrosion, surface

fatigue and volumetric aging of the material.

Skills:
Can plan and carry out experimental research of specific processes taking place in machines and routine tests of a working machine or a vehicle from a selected group of machines.
Is able to carry out basic measurements of mechanical quantities on the tested working machine with the use of modern measuring systems.
He can design the technology of exploitation of a selected machine with a high degree of complexity.

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:
Written exam, final test

Programme content

The module program covers the following topics:
1. Introduction to technical diagnostics.
2. Methods and reasoning.
3. The essence of reasoning in diagnostics.
4. Observability of the diagnosis object.
5. Technical conditions of the diagnosis object.
6. Forecasting with inference.
7. Diagnostic models and modeling.

Course topics

The lecture program covers the following topics:
1. Introduction to issues in the theory of diagnostics, the concept of technical condition, diagnoses, diagnostic relations.
2. Basics of inference, inference methods, statistical inference, deductive and inductive thinking.
3. Diagnostic reasoning. Generation of diagnostic signals, acquisition and processing of diagnostic information. Limits and permissible values of diagnostic symptoms.
4. Technical conditions, number of states of the diagnosis object, two- and three-state assessment of the object's condition. Diagnostic observability of the object, output parameters and diagnostic parameters.
5. Forecasting future vehicle states with known and unknown symptom trend models.
6. Methods and algorithms for diagnosing vehicles. Methodology for building diagnostic procedures. Diagnostic experiments.
7. Diagnostic models of technical objects: symptomatic, analytical, holistic and simulation.

Teaching methods

Lecture with multimedia presentation.

Bibliography

Basic
1. Niziński S.: Diagnostyka samochodów osobowych i ciężarowych. Dom Wydawniczy Bellona, Warszawa 1999.
2. Niziński S., Michalski R.: Diagnostyka obiektów technicznych. Wydawnictwo i Zakład Poligrafii Instytutu Eksploatacji w Radomiu, Radom 2002.
3. Żółtowski B.: Podstawy diagnostyki Maszyn. Wydawnictwo Uczelniane Akademii Techniczno-Rolniczej w Bydgoszczy, Bydgoszcz 1996.

Additional
1. Korbisz J., Kościelny J., Kowalczuk Z., Cholewa W., redakcja. Diagnostyka procesów. Modele, metody sztucznej inteligencji, zastosowania. Wydawnictwa Nukowo-Techniczne, Warszawa 2004

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