



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Diagnostics of autonomous vehicle systems [N1MiBP1>DSPA]

### Course

Field of study

Mechanical and Automotive Engineering

Year/Semester

4/7

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

27

Laboratory classes

9

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

4,00

### Coordinators

dr inż. Jerzy Kupiec

jerzy.kupiec@put.poznan.pl

### Lecturers

### Prerequisites

The student has basic knowledge about the construction, operation and exploitation of motor vehicles and their assemblies, has basic knowledge in the field of automotive electronics. The student is able to integrate the obtained information, interpret it, draw conclusions; can connect simple electrical and electronic circuits. The student is aware of the importance of the technical efficiency of the vehicle and understands the technical aspects and consequences of the failure for road safety.

### Course objective

Provide students with knowledge on the possibility of diagnosing motor vehicles with instrumental and non-instrumental methods, evaluation criteria, diagnostic algorithms and modern diagnostic equipment.

### Course-related learning outcomes

Knowledge:

1. 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.
2. 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.

3. Has elementary knowledge of the impact of machinery and technology on the natural environment and global energy balances.

#### Skills:

1. 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
2. Is able to properly use modern equipment for measuring the main physical quantities used in machine research and production control.
3. Has the ability to draw conclusions from the conducted periodic technical tests of vehicles and measurements, and on their basis, issue assessments on the technical condition of vehicles in terms of admitting vehicles to road traffic, as well as the ability to correctly fill in and keep documentation applicable to technical tests at vehicle inspection stations, finding and reading basic technical information from documents of countries other than Poland for vehicles registered for the first time abroad and from vehicle nameplates, as well as knows how to use the knowledge of certified devices and measuring and control instruments as well as the scope of their use and the scope of operational control.

#### Social competences:

1. 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.
2. Is ready to initiate actions for the public interest.
3. Is willing to think and act in an entrepreneurial manner.

### 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 exam during the examination session and passed laboratory classes (reports + tests).

### Programme content

The module program covers the following topics:

- measuring instruments in diagnostics,
- diagnostics of electronic components, OBD,
- general engine diagnostics,
- environmental nuisance,
- diagnostics of systems: steering, suspension, drive, brakes, air conditioning,
- diagnostics of lighting systems
- diagnostics of power supply and energy storage systems,
- ADAS system diagnostics,
- technical inspections of vehicles, SKP.

### Course topics

1. Diagnostics of the hydraulic braking system
2. Diagnostics of the pneumatic braking system
3. Diagnosis of the suspension system
4. Diagnostics of wheels and pressure control systems
5. Diagnostics of the steering system in terms of electric support systems
6. Testing the suspension geometry and the geometry of the vehicle body
7. Basics of diagnostics of electronic systems by OBD - testers, rules of communication
8. Diagnostics of distance control systems
9. Diagnosing the lighting system - classic and automatic systems
10. Diagnostics of the drive system, mechanical and electronic part
11. Diagnostics of the engine control system - error codes, identification, etc.
12. Diagnostics of comfort systems (air conditioning)
13. General engine diagnostics - lubrication, cooling and timing systems

14. Multimeter, oscilloscope and diagnostic tester - diagnostics of electrical circuits
15. Diagnostics of electricity supply and storage systems
16. Testing exhaust fumes and noise in motor vehicles
17. Diagnostics of passive safety systems
18. Diagnostics of active safety systems
19. Remote vehicle diagnostics systems and possibilities
20. SKP and diagnostic lines
21. Programs to support SKP
22. Diagnostics of visibility systems - windows, mirrors, cameras, wipers

The scope of laboratory classes:

1. Using the OBD connector for diagnostics of electronic systems
2. Diagnostics of the braking system
3. Diagnostics of ACC systems and emergency braking systems
4. Diagnostics of the suspension and steering systems
5. Examination of the suspension geometry
6. Lighting diagnostics - manual and automatic systems
7. Diagnostics of ADAS systems based on radars and cameras

### Teaching methods

1. Lecture with a multimedia presentation - a combination of an information and problem lecture;
2. Laboratory - building systems and testing their operation - experimental method.

### Bibliography

Basic

1. Wróblewski P., Kupiec J.: Diagnostowanie podzespołów i zespołów pojazdów samochodowych. WKiŁ, Warszawa, 2015.
2. Kozłowski M. (red.): Budowa i eksploatacja pojazdów, t. II - Obsługa, diagnostyka i naprawa zespołów i podzespołów. Wyd. Vogel Business Media, Wrocław, 2008 i późniejsze wydania.
3. Trzeciak K.: Wyposażenie warsztatów samochodowych. Wyd. Auto, Warszawa, 2005.
4. Niziński S.: Diagnostyka samochodów osobowych i ciężarowych. Dom wydawniczy Bellona, Warszawa, 1999.

Additional

1. Ślaski G.: Studium projektowania zawiesznień samochodowych o zmiennym tłumieniu, Wydawnictwo Politechniki Poznańskiej, Rozprawy. Nr 481. ISSN 0551-6528, Poznań 2012
2. Serwis motoryzacyjny; miesięcznik dla naprawiających i badających pojazdy, PISKP, Warszawa 2018r.

### Breakdown of average student's workload

|                                                                                                                                         | Hours | ECTS |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------|------|
| Total workload                                                                                                                          | 100   | 4,00 |
| Classes requiring direct contact with the teacher                                                                                       | 36    | 2,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 64    | 2,00 |