# COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electric and electronic systems of internal combustion vehicles [S1Elmob1>UEiEPS]

## Course

Field of study
Electromobility

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
full-time

Requirements
compulsory

## Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

## Number of credit points

2,00

## Coordinators

dr inż. Michał Filipiak
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## Lecturers

## Prerequisites

Basic knowledge of electrical engineering, electronics and electrical machines. Linking physics with the principles of operation of technical equipment. Interpretation of wiring diagrams. Combining electrical circuits. Collaboration in a team (group of laboratory). Awareness of the importance and need for the use of electrical and electronic engineering work. The ability to expand its powers.

## Course objective

Getting to know the theoretical and practical problems related to the functioning and diagnosis of electrical and electronic systems used in automotive vehicles with internal combustion engines.

## Course-related learning outcomes

Knowledge:
Knows how to use physical phenomena and principles of mechanics, electricity and thermodynamics to understand the operation and diagnosis of car accessories. He can determine the operational parameters of devices found in motor vehicles, using measuring equipment and diagnoscopes. He knows and understands the fundamental dilemmas of modern civilization related to the mass use of vehicles.

Skills:
Knows how to make an analyse and evaluate the technical condition of equipment and electrical and electronic components used in vehicles and assemble, run and diagnose basic devices and operating systems in vehicles. Is able to use literature sources, integrate acquired information, evaluate it and draw conclusions, as well as formulate and justify opinions and discuss about them.

Social competences:
Understands the importance of knowledge in solving problems in the field of vehicle operation. Is aware of the need to use electrical and electronic systems in industry and vehicles, and the ability to transfer the acquired knowledge in an understandable way.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
- assessment of the knowledge and skills demonstrated during the problem-related pass, carried out in writing or orally.
Laboratory:
- assessment of knowledge and skills related to the implementation of laboratory exercises,
- evaluation of the reports of laboratory tests,
- evaluation of the completed technical report (paper) on modern electrical and electronic systems used in vehicles.

## Programme content

Construction, functional properties, technical parameters, design solutions and methods of testing electrical and electronic systems of combustion vehicles.

## Course topics

Lecture:
Structure, functional properties, technical parameters, design solutions and methods of testing circuit elements: electric power supply, static (batteries) and dynamic (alternators), combustion engine starting, classic and electronic ignition systems, electronic petrol injection systems and injection systems of compression ignition engines ( Diesel).
Laboratory:
Tests of: batteries, sensors used in vehicles, car starters, alternators, classic and electronic ignition systems, Motronic injection and ignition system, lambda sensors, injection system of the compression-ignition engine (Common Rail). Using diagnoscopes: KME, ESCORT, KTS etc.

## Teaching methods

Lecture:
Lecture with multimedia presentation (including: drawings, photographs, animations, sound, films) supplemented with examples given on the board; Presenting a new topic preceded by a reminder of related content, known to students from other subjects; taking into account various aspects of the issues presented, including: economic, environmental, legal, social, etc .
Laboratory:
Demonstrations of practical nuances specific to the realised issues, working in teams.

## Bibliography

Basic:
1. Herner A., Riehl H. J.: Elektrotechnika i elektronika w pojazdach samochodowych, WKiŁ, Warszawa 2014.
2. Pacholski K.: Elektryczne i elektroniczne wyposażenie pojazdów samochodowych, WKiŁ, Warszawa 2014.
3. Rudnicki M.: Diagnostyka i naprawa samochodowych instalacji elektrycznych - samochody z grupy VAG - Skoda (E-book), Wiedza i Praktyka, 2013.
4. Ocioszyński J.: Elektrotechnika i elektronika pojazdów samochodowych : podręcznik dla technikum,

WSiP, Warszawa 2013.
5. Kasedorf J.: Układy wtryskowe i katalizatory, WKiŁ, Warszawa 1998.
6. Praca zbiorowa: Czujniki w pojazdach samochodowych. Informatory techniczne Bosch, WKiŁ, Warszawa 2014.
7. Heiko P.: Układy bezpośredniego wtrysku benzyny w praktyce warsztatowej: budowa, działanie, diagnostyka, WKiŁ 2016.
8. Gustof P.: Badania techniczne z diagnostyką pojazdów samochodowych, Wydawnictwo Politechniki Śląskiej, 2013.
9. Denton T.: Automobile electrical and electronic systems, Arnold, London 2012.

Additional:
1. Bednarek K., Bugała A.: Własności użytkowe akumulatorów kwasowo-ołowiowych, Poznan University of Technology Academic Journals, Electrical Engineering, No 92, Poznań 2017, s. 47-60.
2. Bednarek K., Kasprzyk L.: Zasobniki energii w systemach elektrycznych, Poznan University of Technology Academic Journals, Electrical Engineering, Poznań, No 69, Poznań 2012, p. 199-218.
3. Kasprzyk L., Bednarek K., Dobór hybrydowego zasobnika energii do pojazdu elektrycznego, Przegląd Elektrotechniczny, No 12 (91), 2015, s. 129-132.
4. Gajek A., Juda Z., Czujniki, WKiŁ, Warszawa 2008.
5. Konopiński M.: Elektronika w technice motoryzacyjnej, WKiŁ, Warszawa 1987.
6. Sitek K.: Diagnostyka samochodowa, Wydawnictwo AUTO, Warszawa 1999.
7. Kowalski B.: Badania i diagnostyka samochodowych urządzeń elektrycznych, WKiŁ, Warszawa 1981.

## Breakdown of average student's workload

| | Hours | ECTS |
|---|---|---|
| Total workload | 55 | 2,00 |
| Classes requiring direct contact with the teacher | 30 | 1,00 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 25 | 1,00 |