COURSE DESCRIPTION CARD - SYLLABUS

Course name
Elective subject A: Electrical and electronic systems in vehicles

Course

Field of study
Electrical Engineering

Year/Semester
3/6

Area of study (specialization)

Profile of study
practical

Level of study
First-cycle studies

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	30	
Tutorials	Projects/seminars	

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Faculty of Control, Robotics and Electrical Engineering

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Responsible for the course/lecturer:

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

Understanding the theoretical and practical problems related to the functioning and diagnosis of electrical and electronic systems used in industry, motor vehicles and buses.

Course-related learning outcomes

Knowledge

Can use of physical phenomena and principles of mechanics, electricity and thermodynamics to understand and diagnose the operation of automotive accessories and industrial equipment and define the operating parameters of industrial equipment and occurring in vehicles.

Skills

Knows how to make an analyse and evaluate the technical condition of equipment and electrical and electronic components used in industry and 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. Is able to solve engineering problems in accordance with applicable norms and standards and technologies in force at the plant.

Social competences

Is aware of the need to use electrical and electronic systems in industry and vehicles, and the ability to transfer acquired knowledge in an understandable way. Is aware of the impact of innovation introduced in the enterprise employing him on the development of the region and its own career path.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assess the knowledge and skills demonstrated during the examination of a problematic, realized in the form of written or oral.

Laboratory:

- assessment of knowledge and skills related to the implementation of laboratory exercises,

- evaluation of the reports of laboratory tests,

- checking and rewarding knowledge and practical skills demonstrated during classes.

Programme content

Lecture:

Functional properties, specifications, designs and test methods for circuit elements: a static power supply (batteries) and dynamic (alternators), engine start, classical and electronic ignition systems, electronic fuel injection systems, lighting and signaling devices. Transmitters on the size of non-electrical quantities electrical systems used in the automotive (sensor: linear and angular displacement, speed and crankshaft position, temperature, pressure, air flow, and oxygen sensor) - construction, principle of operation, specifications and methods of diagnosis. Vehicle accessory systems. Energy storage devices used in industry and electric vehicles.

Laboratory:

Performed on the premises of an industrial plant: measurements of selected parameters in vehicle components and systems, tests of electricity storage devices used in vehicles (batteries, supercapacitors), functioning and diagnosis of control systems for the propulsion system of electric buses, hybrid buses, diesel engines, trams, tests used in vehicles non-electric size transducers; operational measurements of vehicle propulsion system components, measurements of insulation resistance and voltage tests of components included in the vehicle: engine, heaters, 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 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	108	4,0
Classes requiring direct contact with the teacher	69	3,0
Student's own work (literature studies, preparation for laboratory classes, preparation for credits, preparation of reports, preparation of thematic technical development) [1]	39	1,0

[1] delete or add other activities as appropriate