COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electrical and electronic systems in vehicles [N1Eltech1>A-UEiEwP]

Course

Field of study
Electrical Engineering

Year/Semester
4/8

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
20

Laboratory classes
20

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

4,00

Coordinators

dr inż. Jarosław Jajczyk
jaroslaw.jajczyk@put.poznan.pl

Lecturers

Prerequisites

Students starting this subject should have basic knowledge of electrical engineering, electronics and electrical machines. Linking physical phenomena with the principles of functioning of technical devices. Interpretation of electrical diagrams. Connecting electric circuits. Cooperation in a team (laboratory group). Awareness of the importance and need to use electrical and electronic devices in the work of an engineer. Ability to broaden your competences.

Course objective

To provide students with theoretical and practical problems related to the functioning and diagnosis of electrical and electronic systems used in industry and motor vehicles.

Course-related learning outcomes

Knowledge:
1. Has detailed knowledge of physical phenomena and principles of mechanics necessary to understand the functioning and diagnosis of automotive accessories and industrial equipment.
2. Knows and understands the laws of electrical engineering and also has a structured and theoretically founded knowledge of the principles of operation and operation of electrical and electronic systems in

vehicles.

Skills:
1. Is able to analyze and assess the technical condition of electrical and electronic devices and components used in vehicles.
2. Is able to assemble, run and diagnose basic devices and systems functioning in motor vehicles, interpret obtained results, formulate and substantiate opinions.

Social competences:
1. Is aware of the need to use electrical and electronic systems in vehicles and the ability to transfer acquired knowledge in an understandable way.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: the knowledge acquired during the lecture is verified during the written test or on the eKursy platform, which consists of 25-35 questions (test and open) with different scores. Passing threshold: 50% of points. The issues on the basis of which the questions are developed will be sent to students by e-mail using the university's e-mail system.
Laboratory: skills acquired during laboratory exercises are verified on the basis of reports made by students at home after the exercises (at least two) and a test or oral answer.

Programme content

Starting and power systems in vehicles. Construction, functional properties, sensors and actuators in spark ignition engine control systems. Diagnostic methods.

Course topics

Lecture: Functional properties, technical parameters, construction solutions and methods of testing circuit components: electric power supply (battery, alternators), combustion engine start-up, classic and electronic ignition systems, electronic petrol injection systems, lighting and signaling devices.
Transducers of non-electric quantities into electrical quantities used in automotive systems (sensors: linear and angular displacement, rotational speed and crankshaft position, temperature, pressure, air flow meters and lambda probe) - construction, principle of operation, technical parameters and methods of diagnosis. Additional vehicle equipment systems.
Laboratory: Research: batteries, sensors used in industry and vehicles, car starters, alternators, classic ignition systems, vehicle lights, engine load sensors, Motronic injection-ignition system, car alarm systems, lambda probes, GPS system. Support of diagnoscopes (PICO, ESCORT, KTS).

Teaching methods

Lecture: multimedia presentation (drawings, photos, animations) supplemented with examples given on the board, initiating discussions during the lecture.
Laboratory: demonstrations, implementation of practical exercises as planned and additional tasks doubled by the teacher.

Bibliography

Basic
1. Herner A., Riehl H. J.: Elektrotechnika i elektronika w pojazdach samochodowych, WKiŁ, Warszawa 2013.
2. Heiko P.: Układy bezpośredniego wtrysku benzyny w praktyce warsztatowej: budowa, działanie, diagnostyka, WKiŁ 2016.
3. Pacholski K.: Elektryczne i elektroniczne wyposażenie pojazdów samochodowych. 1, Wyposażenie elektryczne i elektromechaniczne, WKiŁ, Warszawa 2013.
4. Pacholski K.: Elektryczne i elektroniczne wyposażenie pojazdów samochodowych. 2, Wyposażenie elektroniczne, WKiŁ, Warszawa 2014.
5. Kasedorf J.: Układy wtryskowe i katalizatory, WKiŁ, Warszawa 1998.
6. Filipiak M., Jajczyk J., Nawrowski R., Putz Ł.: Urządzenia diagnostyczne w pojazdach samochodowych, Poznan University of Technology Electrical Engineering Academic Journals, 69, 2012, s. 227-234.

7. Denton T.: Automobile electrical and electronic systems, Arnold, London 2012.
Additional
1. Gajek A., Juda Z., Czujniki, WKiŁ, Warszawa 2008.
2. Praca zbiorowa: Czujniki w pojazdach samochodowych. Informatory techniczne Bosch, WKiŁ, Warszawa 2014.
3. Bednarek K., Bugała A.: Własności użytkowe akumulatorów kwasowo-ołowiowych, Poznan University of Technology Academic Journals, Electrical Engineering, No 92, Poznań 2017, s. 47-60.
4. Jajczyk J., Bałchanowski T.: Stanowisko laboratoryjne do badania układów zapłonowych sterowanych komputerowo, Poznan University of Technology Academic Journals, Electrical Engineering, 92, 2017, s. 61-72.
5. Konopiński M.: Elektronika w technice motoryzacyjnej, WKiŁ, Warszawa 1987.

Breakdown of average student's workload

	Hours	ECTS
Total workload	105	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	2,00