POZNAN UNIVERSITY OF TECHNOLOGY

EUROPEAN CREDIT TRANSFER AND ACCUMULATION SYSTEM (ECTS)

COURSE DESCRIPTION CARD - SYLLABUS

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

Course

Field of study	Year/Semester
Electrical Engineering	4/8
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	polish
Form of study	Requirements
part-time	elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
20	20	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

4,00

Coordinators

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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:

Learning outcomes presented above are verified as follows:
Knowledge acquired as part of the lecture is verified in a written exam, which consists of 15-25 questions (test and open) with various points. Passing threshold: 50% of points. The issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system.
Skills acquired as part of the laboratory are verified based on the submitted reports on the exercises (at least two) and the oral answer.

Programme content

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 (KME, 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	108	4,00
Classes requiring direct contact with the teacher	52	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	56	2,00