COURSE DESCRIPTION CARD - SYLLABUS

Course name

Vehicle's electronic systems

Course

Field of study

Electrical Engineering

Year/Semester

2/3

Area of study (specialization)

Electrical Systems in Industry and Vehicles

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

English

Form of study

full-time

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Faculty of Control, Robotics and Electrical Engineering

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

The student starting this course should have basic knowledge of electrical engineering, electronics, microprocessor technology and electrical machines. He should also be able to interpret electrical diagrams, connect electrical circuits and work in a team.

Course objective

Provide students with knowledge about theoretical and practical aspects related to the functioning and diagnosis of electrical and electronic systems used in motor vehicles.

Course-related learning outcomes

Knowledge

1. Has an in-depth knowledge of physical phenomena and principles of mechanics necessary to understand the operation and diagnosis of electronic car accessories.

2. Has knowledge of the use and application of modern solutions in electrical and electronic systems in vehicles.

Skills

1. Can, on the basis of technical documentation and available literature, analyze and critically evaluate electrical and electronic devices and components used in vehicles.

2. Can assemble, run and diagnose devices and systems functioning in motor vehicles, independently conduct the necessary tests, prepare the documentation of the results and their interpretation, and draw conclusions from the performed experiments.

Social competences

1. He understands that knowledge and skills in issues related to electrical and electronic systems in vehicles require constant expansion and supplementation.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The knowledge acquired during the lecture is verified during the exam, which consists of several dozen closed questions and 3-5 open questions with different scores depending on the degree of their difficulty. 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 or through the Moodle system.

The skills acquired during the laboratory classes are verified on the basis of submitted reports on the exercises (at least two), a test and an oral answer.

Programme content

Lecture: Construction and functional properties of diesel engines (in-line, axial and radial distributor pumps, unit injectors, UPS injection systems and Common Rail system). Data buses in vehicles (LIN, CAN, MOST, FlexRay). Electronic systems of additional vehicle equipment: active and passive safety systems, navigation systems, driving comfort improvement systems, etc. Functional properties, parameters, technical solutions and methods of diagnosing individual systems and their components. Converters of non-electrical quantities to electrical quantities used in automotive systems (sensors: acceleration, linear and angular position, rotational speed, engine load, force, vibration, gyroscopic angular displacement sensors, etc.). Exhaust gas treatment systems in compression-ignition engines.

Laboratory: Research on advanced injection systems, Common Rail diesel engine control systems, ABS and ASR systems, CAN data bus. Computer diagnostics of car alternators.

Teaching methods

Lecture: multimedia presentation (drawings, photos, animations) supplemented with examples given on the blackboard, initiating discussions during the lecture.

Laboratory exercises: demonstrations, implementation of practical exercises according to the plan and additional tasks doubled by the teacher.

Bibliography

Basic

1. Herner A., Riehl H. J.: Elektrotechnika i elektronika w pojazdach samochodowych, WKiŁ, Warszawa 2014.

2. Kowalczyk J., Niedbała T.: Diagnostyka systemów Commom Rail w silnikach o zapłonie samoczynnym, Inter-Team 2014.

3. Zbierski K.: Układy wtryskowe Common Rail. Łódź, 2014.

4. Praca zbiorowa: Układy bezpieczeństwa i komfortu jazdy. Informator techniczny BOSCH, WKiŁ, 2016.

5. Frei M. Samochodowe magistrale danych w praktyce warsztatowej: budowa, diagnostyka, obsługa, WKiŁ, 2010.

6. Denton T.: Automobile electrical and electronic systems, Arnold, London 2017.

7. Jajczyk J., Matwiejczyk K.: CAN bus diagnostics, Computer Applications in Electrical Engineering, 2014, vol. 12, pp. 376-385.

Additional

1. Praca zbiorowa: Zasobnikowe układy wtryskowe Common Rail, WKiŁ, 2009.

2. Gajek A., Juda Z.: Czujniki, WKiŁ, Warszawa 2011

3. Filipiak M., Jajczyk J.: Badanie systemu ESP w warunkach drogowych, Poznan University of Technology Academic Journals, Electrical Engineering, 75, 2013, pp. 199-206.

4. Filipiak M., Jajczyk J.: Diagnostic tests of the ACC radar system, Computer Applications in Electrical Engineering, Published by Poznan University of Technology, Poznań, 2016, vol. 14, s. 509-519.

Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation of reports from laboratory classes, preparation for exam) [1]	30	1,0

[1] delete or add other activities as appropriate