



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electrical engineering and electronics in vehicles

		Course
Field of study		Year/Semester
Construction and Exploitation of Means of Transport		3/6
Area of study (specialization)		Profile of study
Motor vehicles		general academic
Level of study		Course offered in
First-cycle studies		polish
Form of study		Requirements
part-time		compulsory

		Number of hours
Lecture	Laboratory classes	Other (e.g. online)
9	18	0
Tutorials	Projects/seminars	
0	0	
<b>Number of credit points</b>		
2		

		Lecturers
Responsible for the course/lecturer:		Responsible for the course/lecturer:
PhD (Eng) Jerzy Kupiec		
Piotrowo Street, 3		
60 – 965 Poznan, Poland		
Ph: + 48 61 665 2709		
E-mail: <a href="mailto:jerzy.kupiec@put.poznan.pl">jerzy.kupiec@put.poznan.pl</a>		

**Prerequisites**

The student has a basic knowledge of the basics of electrical engineering and electronics.

The student is able to integrate the obtained information, interpret it, draw conclusions; can connect simple electrical and electronic circuits

The student is aware of the importance of the technical efficiency of the vehicle and understands the technical aspects and consequences of the failure for road safety.

### Course objective

Getting to know the theoretical and practical problems related to the construction, functioning and



diagnosis of electrical and electronic systems of motor vehicles and familiarization with modern diagnostic equipment.

### Course-related learning outcomes

#### Knowledge

1. Has extended basic knowledge necessary to understand specialist subjects and specialist knowledge about the construction and operation of a selected group of working and transport machines covered by the department's specialization profile, in particular: 1. Automotive vehicles 2. Mechatronic systems 3. Internal combustion engines.
2. Has a basic knowledge of the standardized rules of recording structures and engineering graphics.

#### Skills

1. Can obtain information from literature, the Internet, databases and other sources. Can integrate the obtained information, interpret and draw conclusions from it, and create and justify opinions.
2. Is able to properly use modern equipment for measuring the main physical quantities used in machine research and production control.

#### Social competences

1. Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture based on credit and the laboratory on the basis of the results of the current control of the preparation and evaluation of reports.

### Programme content

The lectures and laboratory exercises cover the following topics:

- Basic information on the construction and drawing of electrical wiring diagrams in vehicles on a selected example.
- Design and operation of power systems, including operation and characteristics of alternators.
- Construction and operation of vehicle energy storage systems, including familiarization with the most commonly used battery solutions.
- Construction, operation and testing of lighting components, including control and start-up systems.
- Construction and operation of starting systems, starters and start-stop systems.
- Solutions of ignition systems and their components in motor vehicles
- Reading schematics of electronic circuits using modern software.



- Basic engine control systems.
- Application and testing of communication buses on the example of the CAN bus.
- External communication systems with vehicle controllers via the diagnostic socket.
- Identification of the location of components in the vehicle based on information from the software.
- Construction and operation of pressure / position / speed / acceleration sensors
- Testing of selected engine components containing electronic systems.
- Testing of selected mechatronic systems of the vehicle with the use of diagnostic testers.

### Teaching methods

1. Lecture with a multimedia presentation - a combination of an information and problem lecture;
2. Laboratory - building systems and testing their operation - experimental method.

### Bibliography

#### Basic

1. Dyga G., Trawiński G.: Diagnostyka układów elektrycznych i elektronicznych pojazdów samochodowych, WiSP, Warszawa 2014r.
2. Fundowicz P., Radzimierski M., Wieczorek M.: Podstawy elektrotechniki i elektroniki pojazdów samochodowych, WiSP, Warszawa 2015r.
3. Ocioszyński J., Zespoły elektryczne i elektroniczne w samochodach, WNT, Warszawa 1999r.

#### Additional

1. Serwis motoryzacyjny; miesięcznik dla naprawiających i badających pojazdy, PISKP, Warszawa 2018r.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	50	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	25	1,0

<sup>1</sup> delete or add other activities as appropriate