

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Electrical and electronic systems in industry and vehicles</b>		Code <b>1010324381010324813</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>4 / 8</b>
Elective path/specialty <b>Electrical and Computer Systems in</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>part-time</b>	
No. of hours Lecture: <b>18</b> Classes: <b>-</b> Laboratory: <b>18</b> Project/seminars: <b>-</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b> <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  Dr inż. Jarosław Jajczyk email: jaroslaw.jajczyk@put.poznan.pl tel. 616652659 Elektryczny ul. Piotrowo 3A, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge of electrical engineering, electronics and electrical machines.
2	<b>Skills</b>	Linking physics with the principles of operation of technical equipment. Interpretation of wiring diagrams. Combining electrical circuits. Collaboration in a team (group of laboratory).
3	<b>Social competencies</b>	Awareness of the importance and need for the use of electrical and electronic engineering work. The ability to expand its powers.
<b>Assumptions and objectives of the course:</b> Knowledge of both theoretical and practical problems associated with the operation and diagnosis of electrical and electronic equipment used in industry and motor vehicles.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. use of physical phenomena and principles of mechanics to understand and diagnose the operation of automotive accessories and industrial equipment - [K_W03+, K_W04+] 2. define the operating parameters of industrial equipment and occurring in vehicles - [K_W13++]		
<b>Skills:</b> 1. to analyze and evaluate the technical condition of equipment and electrical and electronic components used in industry and vehicles - [K_U05+, K_U11++] 2. assemble, run and diagnose basic devices and operating systems in vehicles - [K_U06+]		
<b>Social competencies:</b> 1. awareness of the need for electrical and electronic industry and vehicles, and the ability to communicate in a meaningful way knowledge - [K_K05+]		
<b>Assessment methods of study outcomes</b>		

<p>Lecture:</p> <ul style="list-style-type: none"> <li>- assess the knowledge and skills demonstrated during the examination of a problematic, realized in the form of written and oral.</li> </ul> <p>Laboratory:</p> <ul style="list-style-type: none"> <li>- assessment of knowledge and skills related to the implementation of laboratory exercises,</li> <li>- checking and rewarding knowledge and skills presented in the course of activities.</li> </ul> <p>Get extra points for the activity in the classroom, and in particular for:</p> <ul style="list-style-type: none"> <li>- making attempts to solve the problems posed zjęciach,</li> <li>- ability to work as a team.</li> </ul>
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**Course description**

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.

**Basic bibliography:**

1. Herner A., Riehl H. J.: Elektrotechnika i elektronika w pojazdach samochodowych, WKiŁ, Warszawa 2014.
2. Ocioszyński J.: Zespoły elektryczne i elektroniczne w samochodach, WNT, Warszawa 1999.
3. Kasedorf J.: Układy wtryskowe i katalizatory, WKiŁ, Warszawa 1998.
4. Kowalski B.: Badania i diagnostyka samochodowych urządzeń elektrycznych, WKiŁ, Warszawa 1981.
5. Konopiński M.: Elektronika w technice motoryzacyjnej, WKiŁ, Warszawa 1987.

**Additional bibliography:**

1. Gajek A., Juda Z., Czujniki, WKiŁ, Warszawa 2011.
2. Sitek K.: Diagnostyka samochodowa, Wydawnictwo AUTO, Warszawa 1999.
3. Denton T.: Automobile electrical and electronic systems, Arnold, London 2000.
4. Praca zbiorowa: Czujniki w pojazdach samochodowych. Informatory techniczne Bosch, WKiŁ, Warszawa 2010.

**Result of average student's workload**

Activity	Time (working hours)
1. Participation in class lectures	18
2. Participation in laboratory classes	18
3. Participate in the consultations on the lecture	6
4. Participate in the consultations on the lab	10
5. Preparation for lecture classes	4
6. Preparation laboratory	12
7. Study reports	12
8. Exam preparation	10
9. Participation in the exam	2

**Student's workload**

Source of workload	hours	ECTS
Total workload	92	3
Contact hours	54	2
Practical activities	42	2