

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Electrical and electronic systems in industry and vehicles</b>		Code <b>1010322331010324813</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>2 / 3</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>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>15</b> Classes: <b>-</b> Laboratory: <b>15</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, microprocessor technology 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, electronic and computer components and equipment in the work of an engineer. 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 systems 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++] 2. use and apply modern solutions in the electrical and electronic industry and vehicles - [K_W04+]		
<b>Skills:</b> 1. on the basis of the technical documentation and literature available to analyze and critically evaluate equipment and electrical and electronic components used in industry and vehicles - [K_U01++] 2. assemble, run and diagnose basic devices and operating systems in vehicles, independently carry out the necessary tests and report the results of experiments carried out - [K_U03++]		
<b>Social competencies:</b> 1. creative approach to solving problems and issues related to the electrical and electronic systems in motor vehicles - [K_K01+]		
<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 completion 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 favoring 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 in class,</li> <li>- ability to work as a team.</li> </ul>
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### Course description

Construction and functional properties of combustion engines ignition (Diesel). Technical solutions diesel engine control systems: line pumps, distributor pumps: axial and radial pump-chips (UIS), injection systems UPS and Common Rail (CR). Electrical and electronic systems, computerized vehicle accessories: active safety systems and passive navigation systems to improve ride comfort, etc. - functional properties, performance, technology and methods of diagnosis of individual systems and their components. Transmitters on the size of non-electrical quantities electrical systems used in the automotive (sensors: acceleration, linear and angular position, speed, engine load, force, vibration, angular displacement gyro sensors, etc.) - the construction, operation, specifications and methods of diagnosis.

### Basic bibliography:

1. Herner A., Riehl H. J.: Elektrotechnika i elektronika w pojazdach samochodowych, WKiŁ, Warszawa 2014.
2. Praca zbiorowa: Sterowanie silników o zapłonie samoczynnym. Informator techniczny BOSCH, WKiŁ, Warszawa 2004.
3. Praca zbiorowa: Układ wtryskowy Common Rail. Informator techniczny BOSCH, WKiŁ, Warszawa 2005.
4. Praca zbiorowa: Promieniowe rozdzielaczowe pompy wtryskowe VR. Informator techniczny BOSCH, WKiŁ, Warszawa 2001.
5. Praca zbiorowa: Mikroelektronika w pojazdach. Informator techniczny BOSCH, WKiŁ, Warszawa 2002.
6. Praca zbiorowa: Układy bezpieczeństwa i komfortu jazdy. Informator techniczny BOSCH, WKiŁ, Warszawa 2003.

### Additional bibliography:

1. Gajek A., Juda Z.: Czujniki, WKiŁ, Warszawa 2011
2. Denton T.: Automobile electrical and electronic systems, Arnold, London 2000.
3. Gunther H.: Dieseldiagnose, Vogel Verlag, Würzburg 2001.
4. Rokosch U.: Airbag und gurtstraffer, Vogel Industrie Medien, Würzburg 2002.
5. Janiszewski T., Mavrantzas S.: Elektroniczne układy wtryskowe silników wysokopięnych, WKiŁ, Warszawa 2001.

### Result of average student's workload

Activity	Time (working hours)
1. Participation in class lectures	15
2. Participation in laboratory classes	15
3. Participate in the consultations on the lecture	6
4. Participate in the consultations on the lab	6
5. Preparation for lecture classes	10
6. Preparation laboratory	8
7. Study reports	10
8. Preparing to pass	15
9. Involved in completing	4

### Student's workload

Source of workload	hours	ECTS
Total workload	89	3
Contact hours	46	2
Practical activities	39	1