



Subject card

Subject name and code	Electronics and electrotechnics, PG_00060844						
Field of study	Chemical Technology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Physical Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Mateusz Kogut					
	Teachers	dr inż. Mateusz Kogut					
		dr hab. inż. Jarosław Wawer					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	0.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours		Self-study	SUM	
	Number of study hours	30	2.0		18.0	50	
Subject objectives	The purpose of the course is to prepare non-electronic engineers to work with specialists in the field. This need arises from the increasing unification of science and technology. Apparatus used in chemical technology and biotechnology, in addition to the use of physical and chemical phenomena, requires basic knowledge of the operation of electronic systems. The combination of all the above-mentioned disciplines will allow conscious planning of work and analysis of chemical and biological samples. The content of the course also addresses practical issues regarding the use of electricity.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U10] is able to select elements of automatic control systems for simple technological processes. Is able to use computer programmes supporting the implementation of tasks typical of control and optimisation of chemical processes	The student is able to decide which elements are needed for process automation.			[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	[K6_W10] Has knowledge in the areas of electrical engineering, electronics, automation and computer science. He knows the principles of operation of control and measurement systems and electronic control systems	The student has the basic knowledge of electrical engineering and electronics to cooperate in the design of automation components in technological processes.			[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
	[K6_K03] is aware of the responsibility for his/her own work and is ready to follow the rules of teamwork and take responsibility for the tasks performed jointly	The student is able to design a part of a larger electronic system and is able to do so safely anticipating potential dangers to the user.			[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work [SK1] Assessment of group work skills		

Subject contents	<p>The content of the course has been selected so that students, after completing this course, will more fully apply their knowledge in other fields. Particular emphasis has been placed on the practical aspect allowing for later work not only in biological and chemical laboratories, but also in positions closely related to industrial production. The primary method used to impart knowledge will be the use of basic mathematics and physics information to analyze the results of measurements. The course framework includes: Basic issues - hydraulic analogy of an electric circuit. Ohm's law, internal resistance of a current source. How to read and draw electrical diagrams. Line voltage, three-phase current. Work, power, effective power. Basic electronic components - resistors, designations, basic parameters. Kirchhoff's first and second laws. Capacitors - technical parameters. The use of capacitors in the construction of integrating and differentiating circuits. Diodes - construction of semiconductor circuits. Types of diodes (rectifier diodes, Zener diodes, LEDs, RGB). Single- and double-voltage rectifiers, Graetz bridge. Stabilizers (circuits with capacitor, Zener diode, transistor, monolithic stabilizers). Bipolar transistors (construction, characteristics, operating states, circuits). Operational amplifiers (example applications). Digital technology (TTL/CMOS technology). Microcontrollers - basic knowledge. Application of piezoelectric elements. Biosensors. Temperature measurement and control. DC motors and generators, AC motors. Power regulators. Transmission of electric power. Laboratory classes will consist of the following exercises: Testing of DC machines. Measurement of resistance. Diodes and transistors. Rectifier systems and voltage stabilizers. Electrical measurement of non-electrical quantities. Digital integrated circuits. Thyristor power regulator</p>														
Prerequisites and co-requisites	Basic knowledge of mathematics and physics.														
Assessment methods and criteria	<table border="1" data-bbox="448 595 1487 734"> <thead> <tr> <th data-bbox="448 595 798 633">Subject passing criteria</th> <th data-bbox="802 595 1141 633">Passing threshold</th> <th data-bbox="1145 595 1487 633">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 640 798 669"></td> <td data-bbox="802 640 1141 669">50.0%</td> <td data-bbox="1145 640 1487 669">60.0%</td> </tr> <tr> <td data-bbox="448 676 798 705"></td> <td data-bbox="802 676 1141 705">100.0%</td> <td data-bbox="1145 676 1487 705">20.0%</td> </tr> <tr> <td data-bbox="448 712 798 734"></td> <td data-bbox="802 712 1141 734">60.0%</td> <td data-bbox="1145 712 1487 734">20.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade		50.0%	60.0%		100.0%	20.0%		60.0%	20.0%
Subject passing criteria	Passing threshold	Percentage of the final grade													
	50.0%	60.0%													
	100.0%	20.0%													
	60.0%	20.0%													
Recommended reading	Basic literature	<p>1) Paul Horowitz, Winfield Hill, Sztuka elektroniki cz. 1-2, Wydawnictwo WKŁ, Warszawa 2013</p> <p>2) Paweł Hempowicz, "Elektrotechnika i elektronika dla nieelektryków", Wydawnictwo WNT, Warszawa, 1999</p> <p>3) Miesięcznik Elektronika dla Wszystkich, Wydawnictwo AVT</p>													
	Supplementary literature	1) Cathleen Shamieh, Elektronika dla bystrzaków., Septem, Gliwice 2017													
	eResources addresses	<p>Podstawowe http://mikrokontrolery.blogspot.com/ - https://www.youtube.com/@RSElektronika - Adresy na platformie eNauczanie: Elektrotechnika i elektronika, Technologia chemiczna, I stopień, 2023/2024 - Moodle ID: 35310 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=35310</p>													
Example issues/ example questions/ tasks being completed															
Work placement	Not applicable														