Fundamentals of automation and electrical engineering - opis przedmiotu

Informacje ogólne

Nazwa przedmiotu	Fundamentals of automation and electrical engineering
Kod przedmiotu	06.9-WM-MaPE-P-FndAutElectEng-23
Wydział	Wydział Nauk Inżynieryjno-Technicznych
Kierunek	Management and Production Engineering
Profil	ogólnoakademicki
Rodzaj studiów	pierwszego stopnia z tyt. inżyniera
Semestr rozpoczęcia	semestr zimowy 2023/2024

Informacje o przedmiocie

Semestr	2
Liczba punktów ECTS do zdobycia	4
Typ przedmiotu	obowiązkowy
Język nauczania	angielski
Sylabus opracował	• dr inż. Grzegorz Pająk • dr inż. Iwona Pająk

Formy zajęć

Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Wykład	15	1	-	-	Zaliczenie na ocenę
Laboratorium	30	2	-	-	Zaliczenie na ocenę

Cel przedmiotu

The aim of the course is to provide information on the basic laws of electrical engineering, developing the ability to analyze and measure basic parameters in simple electrical circuits. Obtaining basic knowledge in the field of control and automatic regulation of simple automation systems.

Wymagania wstępne

High school level physics

Zakres tematyczny

Lecture

1. Basic concepts, similarities between gravitational and electric fields, basic electrical quantities, measurements of electrical quantities.
2. Ohm's law, Kirchhoff's 1st and 2nd law, structure of an electric circuit.
3. Switching elements of industrial automation, logic functions, implementation of logic functions in relay technology.
4. Designing combinational circuits, minimizing logic functions.
5. Designing sequential circuits, the use of flip-flops.
6. Introduction to pneumatic systems, basic elements, used symbols, diagrams of pneumatic systems.
7. Introduction to control and regulation systems.
8. Final test.

Laboratory

1. Occupational health and safety guidelines. Laboratory equipment: measuring devices, power supplies and auxiliary devices.
2. Wiring simple electric circuits.
3. Measurements of basic electrical quantities with analog and digital meters.
4. Study of Ohm's law in DC circuits.
5. Investigation of Kirchhoff's laws I and II in DC circuits.
6. Wiring simple switching systems in relay technology.
7. Implementation of logic functions in relay technology.
8. Design and implementation of simple combinational circuits in relay technology.
9. Design and implementation of complex combinational circuits in relay technology.
10. Design and implementation of simple sequential circuits in relay technology.
11. The use of flip-flops to implement simple sequential circuits in relay technology.
12. Basic elements of pneumatic systems.
13. Direct and indirect control of single and double acting actuators.
14. Implementation of logic functions using pneumatic elements.
15. Implementation of the selected automation system using the discussed pneumatic elements.

Metody kształcenia

Lecture: a conventional lecture

Laboratory: practical classes in the laboratory

Efekty uczenia się i metody weryfikacji osiągania efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
basic knowledge of the principles of carrying out and processing the results of physical measurements, types of measurement uncertainties, ways of calculating and expressing them	• K_W04	• obserwacje i ocena umiejętności praktycznych studenta • wykonanie sprawozdań laboratoryjnych	• Laboratorium
basic knowledge in the field of automation systems along with the selection of automation systems for technological processes as an engineering discipline related to Management and Production Engineering; ability to design a simple automation system using appropriate techniques, methods and tools	• K_W11 • K_U24	• aktywność w trakcie zajęć • kolokwium • obserwacje i ocena umiejętności praktycznych studenta	• Wykład • Laboratorium
basic knowledge of methods, techniques and tools used for solving simple engineering tasks related to Management and Production Engineering	• K_W39	• bieżąca kontrola na zajęciach • kolokwium • wykonanie sprawozdań laboratoryjnych	• Wykład • Laboratorium
ability to apply mathematical methods and plan engineering activities in the field of mechanical engineering and to develop the results of those tests and engineering works, and to draw conclusions and formulate opinions on technical matters	• K_U02	• obserwacje i ocena umiejętności praktycznych studenta • wykonanie sprawozdań laboratoryjnych	• Laboratorium
ability to prepare, document and elaborate in written form the issues related to mechanical engineering processes; document the course of work in the form of a test report or measurement report; ability to develop test results and present them in a clear report	• K_U05 • K_U15	• wykonanie sprawozdań laboratoryjnych	• Laboratorium
ability to interact or work in a group, taking various roles	• K_K03	• bieżąca kontrola na zajęciach	• Laboratorium

Warunki zaliczenia

Lecture: a positive result of the assessment via a written test

Laboratory: the average of grades obtained from written tests and lab reports.

Final grade: the condition for passing the course is to pass all its forms, the final grade for the course is the arithmetic mean of the grades for individual forms of classes.

Literatura podstawowa

1. Ebel F., Idler S., Prede G. , Scholz D., *Fundamentals of automation technology, Technical book*, Festo Didactic GmbH 2008.
2. Hacker V., Sumereder C., *Electrical Engineering : Fundamentals*, De Gruyter Oldenbourg, 2019.
3. Johnson C.D., *Process Control Instrumentation Technology*, Pearson Education Limited 2014.
4. Kories R., Schmidt-Walter H., *Electrical Engineering A Pocket Reference*, Artech House, 2007.
5. Rauf S. B., *Electrical Engineering for Non-electrical Engineers*, The Fairmont Press, Inc. 2016.

Literatura uzupełniająca

1. Bhattacharya S.K., Rastogi K. M., *Experiments in Basic Electrical Engineering*, NEW AGE International Publishers. 2017.
2. Love J., Process *Automation Handbook: A Guide to Theory and Practice*, Springer, 2007.
3. Manesis S., Nikolakopoulos G., *Introduction To Industrial Automation*, Taylor & Francis Inc, 2018.
4. Martin P., Gregory H., *Automation Made Easy : Everything You Wanted to Know About Automation and Need to Ask*, Research Triangle Park, NC: International Society of Automation [ISA], 2010.

Uwagi

Zmodyfikowane przez dr inż. Grzegorz Pająk (ostatnia modyfikacja: 03-05-2023 11:15)