COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electronics in machines [N1MiBP1>EwMiP]

Course

Field of study
Mechanical and Automotive Engineering

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
9

Laboratory classes
9

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr inż. Jerzy Kupiec
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Lecturers

Prerequisites

The student has basic knowledge of the basics of electrical engineering and electronics, can integrate the obtained information, interpret it, draw conclusions; can connect simple electronic circuits. The student is aware of the social and economic meaning of electronics.

Course objective

Getting to know the structure and functioning of basic semiconductor elements and electronic circuits used in electronic devices

Course-related learning outcomes

Knowledge:
1. Has knowledge in the field of mathematics, including algebra, analysis, theory of differential equations, probability, analytical geometry necessary to: describe the operation of discrete mechanical systems, understand computer graphics methods, describe the operation of electrical and mechatronic systems.
2. Has knowledge in the field of physics, including the basics of classical mechanics, optics, electricity and magnetism, solid state physics, quantum and nuclear physics, necessary to understand specialist

lectures in the field of the theory of construction materials and materials science, theory of machines and mechanisms, theory of electric drives and mechatronic systems.
3. Has elementary knowledge of automation systems, microcontrollers, control algorithms, automatic machines and industrial robots, electronic navigation systems used in machines and wired and wireless communication systems in local computer networks used in machines.

Skills:
1. Can search in catalogs and manufacturers" websites ready-made machine components to be used in his own projects.
2. Can plan and carry out the process of constructing uncomplicated machinery units or machines and formulate requirements for electronic components and automatic control systems for industry specialists in mechatronic systems.
3. Can prepare and present a short verbal and multimedia presentation devoted to the results of an engineering task.

Social competences:
1.Is ready to critically assess his knowledge and received content.
2. 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 his own.
3.Is ready to fulfill social obligations and co-organize activities for the benefit of the social environment.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Assessment based on a written credit and laboratory classes (reports + tests).

Programme content

The module program covers the following topics:
- electronic circuits, semiconductors, integrated circuits,
- diodes, transistors,
- vibration generators, filters, rectifiers, stabilizers,
- logic circuits,
- LTSpice program.

Course topics

-Electronics basic concepts - the concept of electronics and microelectronics, electronic circuits, integrated circuits, materials for the construction of electronic circuits, semiconductors, electrical signals and their parameters, physical units, electronic diagrams.
-Diode in rectifiers and stabilizers; basis of operation, structure, characteristics and parameters. Half-period and full-period rectifiers, construction and characteristics of the voltage stabilizer.
-Field and bipolar transistors; structure, characteristics and application.
-Vibration generators; C, LC, RC - conditions for generating vibrations, methods of calculating frequency, generators of sinusoidal and square vibrations, basic parameters.
-Filters; types, characteristics, construction diagrams, rules for determining the cut-off frequency and application.
- Amplifiers in electronic circuits - differentiating, integrating and summing circuits, examples of application.
-Logic circuits - construction and operation of basic logic gates.
-As part of the laboratory classes, students will learn about the issues discussed in the lecture by building, testing and determining the characteristics of electronic circuits in the LTSpice software.

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. Herner A., Riehl H.J. : Elektrotechnika i elektronika w pojazdach samochodowych. WKIŁ 2006r.
2. Rusek M., Pasiebiński J.: Elementy i układy elektroniczne w pytaniach i odpowiedziach. WNT Warszawa 1997r.
3. Dobrowolski A., Majda E., Jachna Z., Wierzbowski M.: Elektronika ależ to bardzo proste, BTC Legionowo 2013r
Additional

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	18	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	32	1,00