COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electronics and power electronics [S1Eltech1>EiE1]

Course

Field of study
Electrical Engineering

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Knowledge in the field of mathematics, physics and circuit theory at the level of the first year of study. Ability to understand and interpret the transmitted messages and effective self-education in the field related to the chosen field of study.

Course objective

Familiarization with the construction, parameters and applications of basic electronic components. Getting to know the principles of operation of analog and digital electronic circuits. Acquiring the ability to design electronic circuits at the basic level.

Course-related learning outcomes

Knowledge:
1. Knows and understands the basic laws of electrical engineering, properties of elements of electrical circuits, has detailed knowledge of the theory of electrical circuits (for steady and transient states), knows and understands the theory of long line [K1_W04].
2. Has basic knowledge about the life cycle of microprocessor devices, systems and systems and their applications in selected industries [K1_W07].

3. Knows the structure and operation of electronic, optoelectronic and simple analog and digital electronic and power electronic devices, understands the processes occurring in their life cycle [K1_W014].

Skills:
1. Is able to use a foreign language at B2 level of the European System of the Description of Language Education, as well as read and understand catalog cards, application notes, standards and technical documentation as well as manuals for electrical equipment [K1_U01].
2. Is able to design and manufacture, in accordance with the given specification and using appropriate methods, techniques, tools and materials, typical electrical systems intended for various applications [K1_U03].

Social competences:
Is aware of the need to initiate actions for the public interest, understands the various aspects and effects of electrical engineer activities, including environmental impact, and the associated responsibility for decisions [K1_K02].

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 of knowledge and skills demonstrated during the written test-problem exam - based on the number of points obtained.

Programme content

The module includes the following program content:
1/ p-n junction,
2/ semiconductor diodes,
3/ transistors,
4/passive elements,
5/ signal amplifiers,
6/ power amplifiers,
7/ analog filters,
8/ basics of digital technique.

Course topics

The lecture covers the following topics:
1/ principle of operation and parameters of the p-n junction,
2/ basic types of semiconductor diodes,
3/ rectifier systems and power supplies,
4/ transistors: bilar, JFET, MOSFET - parameters and operating systems,
5/ applications of transistors,
6/ passive elements: resistors, capacitors, inductive elements - basic parameters and applications in electronic systems,
7/ operational amplifier: structure, parameters and applications as a signal amplifier,
8/ power amplifiers - classification and parameters,
9/ analog filters - characteristics and design principles,
10/ introduction to digital technology: mathematical operations, logic gates, digital functional blocks and semiconductor memories - parameters and applications.

The laboratory includes tests of the following semiconductor elements and electronic cicuits:
1/ semiconductor diode and 1-phase rectifier systems,
2/ Zener diode and voltage stabilization systems,
3/ LED diode,
3/ bipolar transistors and MOSFETs and their operating circuits, including: Darlington circuit and differential amplifier,
4/ operational amplifier and signal amplifiers using it,
5/ basic digital circuits - logic gates, functional blocks and SRAM memory.

Teaching methods

Lecture with multimedia presentation (diagrams, formulas, definitions, etc.) supplemented by the content given on the board.

Bibliography

Basic
1. Z. Kulka, M. Nadachowski, Analogowe układy scalone, WKŁ, W-wa, 1980.
2. J. Kalisz, Podstawy elektroniki cyfrowej, WKiŁ, W-wa, 2002.
3. P. Górecki, Wzmacniacze operacyjne, Wydawnictwo BTC, W-wa, 2004.
4. P. Horowitz, W. Hill, Sztuka elektroniki. Część 1 i 2, WKŁ, 2014.
Additional
1. M.P. Kaźmierkowski, J.T. Matysik, Wprowadzenie do elektroniki i energoelektroniki, Oficyna Wyd. PW, W-wa, 2005.
2. P. Scherz, S. Monk, Practical Electronics for Inventors, Fourth Edition, Mc Graw Hill, 2016.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00