COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of electronics [S1MNT1>C-PE]

Course

Field of study
Mathematics of Modern Technologies

Year/Semester
2/4

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of mathematical analysis, basics of electrical engineering and metrology. Using the laws of electrical engineering to analyze AC and DC circuits. Awareness of need to expand their competences and is ready to work in a team.

Course objective

Getting to know the properties of basic electronic components and circuits used in practice and methodology of their analysis and experimental research.

Course-related learning outcomes

Knowledge:
• hasstructuredknowledgeaboutclassificationofbasicelectroniccomponentsandmethodsofelectrical signal processing [K_W03(P6S_WG), K_W04(P6S_WG)];
• can explain electronic techniques of signal acquisition and processing for industrial applications

[K_W04(P6S_WG)];
• has knowledge about design, construction and operation of electronic devices, taking into account appropriate principles of reliability, operation, safety and ergonomics [K_W 05(P 6S_W G), K_W 09(P 6S_W G)].

Skills:
• knows and recognizes basic electronic components, their properties, can read their parameters and carry out their basic measurements and tests in accordance with general requirements and documentation [K_U05(P6S_UW), K_U06(P6S_UW), K_U11(P6S_UW)];
• can design and run an electronic circuit for simple engineering applications [K_U13(P6S_UW)];
• he can use the acquired knowledge to carry out simple service activities in the field of electronic engineering [K_U12(P6S_UW)];
• can use technical documentation regarding the properties and parameters of electronic components and circuits and analyze and evaluate various solutions [K_U08(P6S_UW), K_U15(P6S_UK)].

Social competences:
• is able to critically look and evaluate the properties of simple electronic systems solutions while meeting his own cognitive limits that motivate to constantly improve his qualifications [K_K01(P6S_KK), K_K03(P6S_KO)];
• able to operate in a responsible and entrepreneurial manner in the field of electronic engineering [K_K03(P6S_KO)];
• he is aware of his social role, fulfills his obligations to formulate and communicate reliable scientific and technical knowledge related to electronic engineering [K_K03(P6S_KO)].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: evaluation of knowledge and skills demonstrated on a written test and calculus nature (the written test sheet contains the information necessary to perform calculus tasks); threshold for passing the test 50%; rewarding grades from laboratory classes as well as presence and activity during the lecture;
Laboratory classes: entry tests and rewarding knowledge necessary to implement problems posed in the area of laboratory tasks; assessment of skills related to implementation of measurement task; assessment of reports on the exercises performed; assessment of knowledge demonstrated on the written test in laboratory classes (test questions and calculation tasks).

Programme content

Presentation of basic passive and active electronic components and typical circuits built using them. Individual performance of a simple design, assembly and testing of a simple electronic circuit. Introduction to digital circuits - methods of synthesis as well as analysis.

Course topics

Update: 01.06.2023r.
Lectures:
• passive and active elements used in electronic circuits;
• properties and application of basic semiconductor elements: rectifier universal diodes, zener diodes, bipolar and field effect transistors, optoelectronic;
• power supply of electronic circuits;
• ac and dc voltage amplifiers;
• the role of negative and positive feedback;
• operational amplifiers - properties, parameters and applications;
• unstabilized and stabilized power supplies;
• fundamentals of signal filtration;
• fundamentals of digital technology and simple logical functors;
• construction, diagnostics and testing of simple electronic circuits;
• zajęcia laboratoryjne.
Laboratory classes: laboratory classes are carried out over fifteen 90-minute meetings, in 4 subgroups; the subject of the laboratory classes is divided into four parts:
• the subject of the first part is: getting to know the measuring instruments and techniques used during the

laboratory classes;
• in the second part, laboratory exercises are performed about basic passive and active electronic components, electronic circuits, paying attention to their practical application;
• the subject of the third part is an introduction, presentation of equipment for electronic components assembly work and assembly of a simple, prepared printed circuit board;
• the last class includes laboratory exercises concerning the properties of digital electronic circuits: combinational and sequential; the methods of synthesizing simple circuits containing logic gates, multiplexers, flip-flops are presented.

Teaching methods

Lectures: lectures are carried out using multimedia presentations illustrated with examples of simulations and the necessary mathematical calculations on the blackboard;
Laboratory classes: laboratoryexercisesareconductedinlaboratorygroups;duringtheclasses,connection of the measurement system is performed, the indicated measurements are carried out, the measurement results are processed and the report is prepared; additionally, individual design and assembly of simple printed circuit boards is performed; the applied teaching methods are student-oriented and motivate them to actively participate in the teaching process through discussions and presetation.

Bibliography

Basic:
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• Z. Kulka, M. Nadachowski, Wzmacniacze operacyjne i ich zastosowania cz. 1 i 2 WNT 1983;
• U. Tietze, Ch. Schenk, Układy półprzewodnikowe, WNT, Warszawa 2007;
• J. Zakrzewski, Czujniki i przetworniki pomiarowe, Wyd. Politechniki Śląskiej, Gliwice 2004;
• J. Rydzewski, Pomiary oscyloskopowe, WNT, Warszawa, 2007;
• K. Booth, Optoelektronika, WKiŁ, Warszawa, 2001.

Additional:
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• Denton J. Dailey, Electronic Devices and Circuits, copyright 2001 by Prentice-Hall, Inc., Upper Sadle River, New Jersey 07548, USA. Warszawa 2002;
• Bibliografia wyszukana przez studenta ze źródeł drukowanych i elektronicznych;
• S. Tumański, Technika pomiarowa, WNT 2007;
• W. Kester, Przetworniki A/C i C/A: teoria i praktyka, BTC, 2012;
• W.E. Ciążyński, Rzeczywiste wzmacniacze operacyjne w zastosowaniach, Wyd. PŚ, Gliwice, 2012;
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• Z. Nawrocki, Wzmacniacze operacyjne i przetworniki pomiarowe, Wyd. PWr, Wrocław, 2008;
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• L. Hasse, Zakłócenia w aparaturze elektronicznej, Radioelektronik, Warszawa,1995;
• Aviation Electronics Technician - Basic, NAVEDTRA 14028, 2003;
• www.electropedia.org.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	62	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	63	2,50