COURSE DESCRIPTION CARD - SYLLABUS

Course name

Analog and digital electronic circuits

Course

Field of study

Electrical engineering

Year/Semester

4/8

Area of study (specialization)

Energy conversion systems and control systems in mechatronics

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

part-time

Requirements

elective

Number of hours

Lecture

20

Laboratory classes

10

Other (e.g. online)

Tutorials

Projects/seminars

10

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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Prerequisites

Knowledge in the field of analogue and digital electronics at the level of the third year of study. Ability to understand the content of technical documentation regarding electronic systems and its analysis.

Course objective

Getting to know the principles of operation of complex analog and analogue-digital electronic circuits. Acquiring the ability to design analog-digital 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. 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].

3. Knows and understands typical engineering technologies in the field of study, is familiar with their latest development trends [K1_W018].

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].

3. Is able to develop project documentation of an engineering task, using methods, techniques, tools and materials appropriately selected for electrical engineering [K1_U07].

Social competences

1. Understands the importance of knowledge in solving problems and raising professional, personal and social competences; is aware that in technology knowledge and skills quickly become obsolete [K1_K01].

2. Is able to think and act in an entrepreneurial manner in the field of electrical engineering [K1_K04].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

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

Project

1. Continuous assessment, rewarding the increase in the ability to use known principles and methods.

2. Assessment of knowledge and skills related to the implementation of the project.

Laboratory

1. Continuous assessment, rewarding the increase in the ability to use known principles and methods,

2. Assessment of knowledge and skills related to the exercise, evaluation of the exercise report.

Common methods for projects and the laboratory

Getting extra points for activity during classes, especially for:

- proposing to discuss additional aspects of the issue,

- effectiveness of applying the acquired knowledge while solving a given problem,

- ability to work within a team that practically performs a specific task in a laboratory,

- comments related to the improvement of teaching materials.

Programme content

Properties of specialized microelectronic circuits (amplifiers) for analog signal processing. Analog connectors - construction, parameters and work systems. Reference voltage generators - construction, parameters and work systems. Power supply systems - linear and impulse converters - properties and operating systems. Introduction to digital-to-analog and analog-to-digital processing of signals. Construction and parameters of analog-to-digital and digital-to-analog converters and digital potentiometers. Construction and design principles of signal recognition path from a physical quantity converter to an electric signal. Analog-to-digital and digital-to-analog converters in a microprocessor system - principles of cooperation. Current, voltage, temperature and acceleration measuring transducers - construction and parameters. Systems for coupling galvanically isolated electronic systems - construction, parameters and applications. Small and medium scale digital integrated circuits - parameter overview. Basic principles of designing analogue-digital electronic systems.

Teaching methods

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

2. Projects and laboratory exercises: multimedia presentation, presentation illustrated with examples given on the board and performance of tasks given by the teacher - practical exercises.

Bibliography

Basic

1. Z. Kulka, M. Nadachowski, Analogowe układy scalone, WKŁ, W-wa, 1980.

2. J. Szabatin, Podstawy teorii sygnałów, WKŁ, W-wa, 2000.

3. P. Górecki, Wzmacniacze operacyjne, Wydawnictwo BTC, W-wa, 2004.

4. F. Maloberti, Przetworniki danych, WKŁ, W-wa, 2010.

5. P. Horowitz, W. Hill, Sztuka elektroniki. Część 1 i 2, WKŁ, W-wa, 2014.

Additional

1. W. Kester, The Data Conversion Handbook, Elsevier, 2005.

2. Technical documentation of electronic components and their application notes as well as educational materials - available on company websites: Analog Devices/Linear Technology, Texas Instruments.

Breakdown of average student's workload

	Hours	ECTS
Total workload	105	4,0
Classes requiring direct contact with the teacher	70	3,0
Student's own work (literature studies, preparation for laboratories and project, report preparation, project preparation, preparation for exam) [1]	35	1,0

[1] delete or add other activities as appropriate