COURSE DESCRIPTION CARD - SYLLABUS

Course name
Analog and digital electronic circuits [N1Eltech1>A-AiCUE]

Course

Field of study
Electrical Engineering

Year/Semester
4/8

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
20

Laboratory classes
10

Other (e.g. online)
0

Tutorials
0

Projects/seminars
10

Number of credit points

4,00

Coordinators

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Lecturers

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:

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

The module program covers the following issues:
1/ special purpose signal amplifiers,
2/ analog switches,
3/ reference voltage generators,
4/ digital-to-analog converters and digital potentiometers,
5/ analog-to-digital converters,
6/ systems for galvanic separation of electronic systems
7/ stabilizers of voltages supplying electronic circuits,
8/ temperature transducers and measuring systems,
9/ current and voltage transducers and measuring systems,
10/ principles of designing analog-digital systems.

Course topics

The lecture program covers the following topics:
1/ structures and principles of use of special-purpose signal amplifiers,
2/ basics of digital-analog and analog-to-digital signal processing,
3/ architecture of digital-to-analog and analog-to-digital converters,

4/ principles of powering electronic systems,
5/ basics of measurement of basic physical quantities in industrial systems,
6/ basics of designing electronic systems.

The design class program includes:
1/ discussion of the structure and principles of designing the analog forefield of an analog-to-digital converter,
2/ presenting the principles of selecting analog-to-digital converters,
3/ individual implementation of an electronic system project by the student,
4/ discussion of completed projects.

The laboratory program includes research:
1/ differential and instrument amplifiers,
2/ reference voltage generators - series and parallel,
3/ supply voltage stabilizers - linear and pulse,
4/ digital-to-analog and analog-to-digital converters.

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	4,00
Classes requiring direct contact with the teacher	70	3,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	35	1,00