



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electronics [N1Eltech2>Elektr2]

Course

Field of study

Electrical Engineering

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

part-time

Requirements

compulsory

Number of hours

Lecture

0

Laboratory classes

20

Other

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

mgr inż. Amadeusz Gąsiorek

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Lecturers

Prerequisites

The student has knowledge of mathematics, physics, and circuit theory at the first-year level. The student has the ability to understand and interpret the information provided and to effectively engage in self-study in a field related to their chosen field of study. Competencies - The student is aware of the need to expand their competencies, demonstrates a willingness to work in a team, and the ability to comply with the rules applicable during lectures and laboratory classes.

Course objective

To familiarize students with the structure, parameters, and applications of basic electronic components. To familiarize students with the principles of operation of analog and digital electronic circuits and to acquire the skills to design them at a basic level.

Course-related learning outcomes

Knowledge:

1. Has advanced knowledge and understanding of electrical engineering laws and phenomena in the field of electrical circuit theory, long lines, and electromagnetic field theory.
2. Knows the structure and operating principles of electronic, power electronic, and microprocessor

devices and systems; understands the processes occurring during their life cycle.
3. Has basic knowledge of lighting technology and optical radiation; knows and understands electrothermal transformations and heat exchange mechanisms.

Skills:

1. Can prepare documentation and specifications for engineering tasks, taking into account technical, systemic, and non-technical aspects, including economic, ethical, and legal considerations.
2. Can plan and conduct simulation and physical experiments, including performing measurements, testing, and diagnosing simple electrical systems and devices.

Social competences:

1. Is willing to improve their professional, personal, and social skills; is aware that knowledge and skills in the field of electrical engineering are rapidly evolving.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Laboratory:

- skills acquired during laboratory classes are verified on the basis of reports and answers given during classes.

Programme content

Properties and characteristics of basic electronic components and devices: passive components, semiconductor diodes, bipolar and field-effect transistors, their operating circuits, and applications. Semiconductor optoelectronic devices - properties and examples of applications. Feedback in analog circuits. The issue of closed-loop stability. Operational amplifiers - ideal and real, and their properties, parameters, and applications. Power amplifiers: classification, properties, and applications. Electronic generators: conditions for oscillation generation, types and applications of generators. Linear circuits - basic properties. Analog filters - types, parameters, and design principles. Mains power supply - structure and parameters. Basics of digital technology: binary number system, logical states and logical operations, logical functions, truth table, digital combinational and sequential blocks. Basic applications of digital circuits. Basic digital circuits of the TTL and CMOS families - structure and parameters. Semiconductor memories - general classification and basic parameters of selected types of memory.

Course topics

Discussion of the basic operating circuits of diodes and transistors. Introduction to the general theory of feedback. Presentation of methods of using operational amplifiers and electronic signal generators. Presentation of the basic properties of analog filters and methods of their design. Discussion of the basic properties of power amplifiers. Fundamentals of digital technology - introduction to Boolean theory, types of digital gates, and digital functional blocks. Presentation of digital memories and basic rules for their use.

Teaching methods

Classes are conducted in the form of laboratory exercises. Teaching methods include:

1. Short theoretical introductions (introductory seminars) to individual thematic blocks.
2. Independent work by students in groups at laboratory stations, consisting of starting up systems, taking measurements (using oscilloscopes, multimeters, power analyzers), and recording results.
3. Analysis and interpretation of the measurement results obtained, comparing them with theory and simulations.
4. Preparation of reports on the experiments carried out.

Bibliography

Basic:

1. A. Chwaleba, B. Moeschke, G. Płoszajski, P. Majdak, P. Świstak, Podstawy elektroniki, Wydawnictwo Naukowe PWN, 2021 (wydanie pierwsze), ISBN: 978-83-01-21628-3.
2. P. Górecki, Wzmacniacze operacyjne, Wydawnictwo BTC, W-wa, 2004 (wydanie pierwsze), ISBN: 978-8-3910-0672-6.

3. P. Horowitz, W. Hill, Sztuka elektroniki. Tom 1-2, Wydawnictwa Komunikacji i Łączności WKŁ, 2018.
4. A. Skorupski, Podstawy techniki cyfrowej, Wydawnictwa Komunikacji i Łączności WKŁ, 2004 (wydanie drugie), ISBN: 9788320613902.

Additional:

1. M.P. Kaźmierkowski, J.T. Matysik, Wprowadzenie do elektroniki i energoelektroniki, Oficyna Wyd. Politechniki Warszawskiej, 2005 (wydanie pierwsze).
2. P. Scherz, S. Monk, Practical Electronics for Inventors, Mc Graw Hill, 2016 (Fourth Edition).

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	20	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	35	1,50