



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electronics

Course

Field of study

Biomedical engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

english

Requirements

compulsory

Number of hours

Lecture

15

Tutorials

Laboratory classes

15

Projects/seminars

Other (e.g. online)

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

prof. DSc. PhD. Eng. Andrzej Milecki

Responsible for the course/lecturer:

MSc. Eng. Roman Regulski

Prerequisites

Physics in the field of the structure of matter and the phenomena of electricity. Basics of electrical engineering. Ability to calculate electrical circuits. Knowledge of properties and parameters of passive elements.

Course objective

Getting to know the structure, operation and characteristics of electronic components and learning the basics of designing and commissioning simple electronic circuits.



Course-related learning outcomes

Knowledge

Methods of assembling electronics. Knowledge of the properties and parameters of passive electronic components

P-n junction, construction and operation of a diode, LED diode, photodiodes and others, diode circuits.

Knowledge of the structure, operation, characteristics and operation models of bipolar and unipolar transistors.

Knowledge about power supply, types and systems of operation of transistors.

Digital circuits: levels, signals, AC conversion, logic gates.

Knowledge of operational amplifiers (WO) and circuit design from WO

Knowledge of advanced integrated circuits.

Skills

Can design and build circuits with different types of diodes

Can select elements, design and build basic transistor circuits

Can find, select and design an electronic circuit with operational amplifiers

Can design and connect simple digital circuits

Is able to analyse scheme of electronic circuit

Social competences

Understands the need for lifelong learning; can inspire and organize the learning process of other people

He/She is aware of the role of electronics in the modern engineering and its importance for society and the environment

Can define priorities for the implementation of a specific task

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

EXAM: Passed on the basis of an examination consisting of 5 general questions (for a correct answer to each question - 1 point. Grading scale: less than 2.6 points - 2, 2.6 ÷ 3.0 - 3.0, 3.1 ÷ 3.5 points - 3.5, 3.6 ÷ 4.0 points - 4.0, 4.1 ÷ 4.5 points - 4.5, 4.6 ÷ 5.0 points - 5.0 very good)

Laboratory: Credit based on the correct implementation of exercises and reports on each laboratory exercise according to the instructions of the laboratory teacher. Before the exercises, short entrance tests, and after the exercises, a written final test. In order to pass the laboratories, all exercises must be passed (positive grade from the answers and the report).



Programme content

1. Structure and electrical properties of an atom, conductors, semiconductors, insulators. Passive components used in electronic circuits. Methods of assembling electronics
2. Semiconductors, p-n junction. Diodes, characteristics, rectifiers, types and parameters of diodes. LEDs, photodiodes, other diodes.
3. Bipolar transistors: structure, characteristics, parameters, working principles, types.
4. Transistor power supply configurations. JFET and MOSFET transistors. Thyristor, triak
5. Integrated circuits, Operational amplifiers, comparators, integrated stabilizers,
6. AD converters. Advanced integrated circuits
7. Basics of digital technology: signal levels, gates and other elements.

Lab:

1. Study of diode systems
2. Investigation of bipolar transistors
3. Study of unipolar transistors
4. Testing of key systems and transistor amplifiers
5. Study of the operational amplifier.
6. Integrated circuits

Teaching methods

Lectures and presentations of models and simulations of circuits

Bibliography

Basic

1. The Art of Electronics Hardcover , 2015, Paul Horowitz , Winfield Hill

Additional

Getting Started in Electronics Spiral-bound . 2000, III Mims, Forrest M



Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	30	1,0

¹ delete or add other activities as appropriate