



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electronics

Course

Field of study

Materials 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

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

prof. DSc. PhD. Eng. Andrzej Milecki

Responsible for the course/lecturer:

PhD. Eng. Dominik Rybarczyk

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. Getting acquainted with microprocessor systems, eg Arduino

Course-related learning outcomes

Knowledge

Knowledge of basic passive electronic components. Electronics assembly methods.

The p-n junction and the structure and operation of a diode and circuits with diodes.

Knowledge of the structure, operation and parameters of bipolar and unipolar transistors

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



Knowledge of integrated circuits and operational amplifiers (WO)

Fundamentals of digital technology. Knowledge of microcontrollers, in particular Arduino.

Skills

Can build circuits with different types of LEDs and analyze their work

Can select elements, design and build a single transistor circuit - a key

Can build a simple microprocessor system based on Arduino

Can analyze a simple 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, insulators and semiconductors, Passive components used in electronic systems. Electronics assembly.
2. Semiconductors, p-n junction. Rectifier circuits.
3. Bipolar transistors: structure, parameters, operation, key.
4. JFET and MOSFET transistors, thyristor, triac.
6. Integrated circuits. Operational and other amplifiers.
7. Basics of digital technology: gates and microprocessors (Arduino).

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. Arduino I.
6. Arduino II

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