



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Electrical engineering and electronics

### Course

Field of study

Management engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

Polish

Requirements

elective

### Number of hours

Lecture

10

Laboratory classes

10

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Ph.D., Eng. Tomasz Jarmuda

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Responsible for the course/lecturer:

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### Prerequisites

High school level mathematics and physics news. Knowledge of the basic quantities describing electrical circuits. The ability to understand and interpret the messages communicated and effective self-education in the field related to the selected field of study.

### Course objective

Getting to know the basics of electrical engineering and electronics, both from the theoretical and practical side. Acquiring the ability to read electrical diagrams, recognize elements, build simple electrical and electronic systems. Ability to algebraically solve simple electrical systems.



### Course-related learning outcomes

#### Knowledge

knows the basic methods, techniques, tools and materials used to solve simple engineering tasks in the field of construction and operation of electrical and electronic devices [P6S\_WG\_16 ],

knows typical industrial technologies and knows the technologies of construction and operation of electrical and electronic devices in depth [P6S\_WG\_17 ].

#### Skills

is able to identify design tasks and solve simple design tasks in the construction and operation of electrical and electronic devices [P6S\_UW\_14 ],

is able to apply typical methods of solving simple problems in the construction and operation of electrical and electronic devices [P6S\_UW\_15 ].

#### Social competences

is aware of the importance and understands the non-technical aspects and effects of 3 engineering activities, including its impact on the environment, and the related responsibility for decisions made [P6S\_KR\_01 ].

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

For laboratories: on the basis of the evaluation of the current progress in the implementation of tasks assessed by written work-reports; final grade based on the results of the average of partial grades (for individual classes).

In the scope of lectures: on the basis of answers to questions about the material assimilated in previous lectures, solving problems, written knowledge check based on a test / answers to questions / solving problems Possibility to conduct the test remotely on the university's eKursy platform.

### Programme content

Electrical properties of various types of materials: conductors, dielectrics, semiconductors; types of electric charge carriers; basic electrical quantities (potential difference, voltage, current, power, energy, resistance, capacitance, inductance, impedance) and the units used to express their magnitude; structure and essential properties of basic elements used in electrical engineering: resistors, coils, capacitors and physical phenomena on which the functioning of these elements is based; basic laws of electrical engineering: Ohm's law, Kirchhoff's laws I and II; properties of the actual voltage source and methods of combining multiple such sources to obtain a replacement source with different parameters; the effect of temperature on conductors and semiconductors and how to use this property in electrical / electronic devices; basic concepts related to AC circuits: instantaneous values of voltage, current, power, relationships of these quantities; average and effective values of voltage and current; principle of operation of electric relays; vector diagrams as used to describe AC components and circuits; active, reactive and apparent power and the relationships between them; RLC circuits, resonance phenomenon; semiconductors, structure and principle of operation of semiconductor elements: diodes,



transistors, thermistors, integrated circuits, photoelectric and luminescent elements; power supply systems, including one- and two-half rectifiers, zener diode stabilizers; a transistor as an amplifier; operational amplifier, logic gates and simple combination circuits, functions of digital elements in complex electronic devices, generator and oscilloscope testing.

### Teaching methods

Lecture: multimedia presentation (including: drawings, photos, animations, films) supplemented with examples given on the board, especially computational examples. Taking into account various aspects of the presented issues, including: economic, ecological, legal and social. Presenting a new topic preceded by a reminder of related content, known to students from other subjects.

Laboratory: performing laboratory exercises in teams (preparation of the stand, building measuring systems, carrying out experiments) with the help and supervision of the teacher.

### Bibliography

#### Basic

1. Bolkowski S.: Elektrotechnika teoretyczna, Wyd. 6, WNT, Warszawa 2001.
2. Kurdziel R.: Podstawy elektrotechniki, WNT, Warszawa 1973.
3. Podstwy elektrotechniki i elektroniki dla nieelektryków, red. J. Smyczek, Wydawnictwo Uczelniane Politechniki Koszalińskiej, 2012.

#### Additional

1. Krakowski M.: Elektrotechnika teoretyczna. Tom 1. Obwody liniowe i nieliniowe, PWN, Warszawa 1995.
2. Bolkowski S., Brociek W., Rawa H.: Teoria obwodów elektrycznych. Zadania, WNT, Warszawa 1995.
3. Podstawy elektrotechniki i elektroniki, A. Kloskowski, J. Wawer, Ł. Marcinkowski, Wydawnictwo Politechniki Gdańskiej 2015.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	40	2,0
Classes requiring direct contact with the teacher	20	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests, project preparation) <sup>1</sup>	20	1,0

<sup>1</sup> delete or add other activities as appropriate