



## COURSE DESCRIPTION CARD- SYLLABUS

Course name

Fundamentals of electronics

### Course

Field of study

Mathematics in Technology

Area of study (specialization)

—

Level of study

first-cycle studies

Form of study

full-time

Year/Semester

2/ 4

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lectures

30

Tutorials

—

Laboratory classes

30

Projects/seminars

—

Other (e.g. online)

—

### Number of credit points

5

### Lecturers

Responsible for the course/lecturer::

dr hab. inż. Grzegorz Wiczyński

Responsible for the course/lecturer::

dr inż. Dariusz Prokop

### Prerequisites

Basic knowledge of electrical engineering and mathematical analysis. Using electrotechnical law to analyze DC and AC circuits. Is aware of the need to expand its competencies and is ready to cooperate within the team.

### Course objective

Learning about the properties of basic elements and electronic circuits used in practice and the methodology of their analysis.



## Course-related learning outcomes

### Knowledge

- well structured knowledge of the classification of basic electronic components and methods of processing electrical signals;
- ability to explain the principles and techniques of acquisition and processing of measurement signals for industrial applications.

### Skills

- ability to design and launch electronic systems for simple engineering applications;
- ability to perform simple maintenance work in the area of electronic engineering.

### Social competences

- ability to work in a responsible and entrepreneurial manner in the field of electronic engineering.

## Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

**Lectures:** evaluation of the knowledge and skills shown during a written test (a test sheet includes information necessary to solve computational tasks). Passing threshold of test equals 50%. The grade from laboratory as well as attendance and activities during the lectures are taken into account.

**Laboratory classes:** evaluation of the knowledge and skills connected with realization of a given task Evaluation of the report. Continuous assessment in every class (rewarding activity and quality of perception). Final test in written.

## Programme content

Update: 10.09.2020r.

**Lectures:** passive and active elements used in electronic systems. Properties and applications of basic semiconductor components: rectifier / universal diodes, Zener diodes, bipolar and unipolar transistors, optoelectronic. Electronic devices power supply. DC and AC voltage amplifiers. The negative and positive feedback in electronic circuits. Operational amplifiers – properties, parameters and applications. Unstabilized and stabilized power supplies. Fundamentals of signal filtration. Fundamentals of digital electronics and simple logical functors. Construction, diagnostics and testing of simple electronic systems.

**Laboratory classes:** laboratory classes are realized in fifteen 90-minute meetings, in 4 subgroups; the topic of laboratory classes is divided into four parts;

- subjects of the first part are: getting to know the measuring instruments and techniques used in the laboratory classes;
- in the second part, laboratory tests are carried out on basic passive and active electronic components and systems, paying attention to their practical application;



- the topics of part three are an introduction to PCB design using the EDA software, the presentation of the equipment for electronic component mounting work and the mounting of a simple prepared PCB;
- in the last class, laboratory exercises are performed on the properties of digital combinational and sequential electronic circuits. The methods of synthesis of simple systems containing logic gates, multiplexers, flip-flops are presented.

### Teaching methods

The applied teaching methods are student-oriented and motivate students to actively participate in the teaching process through discussions and lectures.

**Lectures:** multimedia presentations expanded by examples shown on a board. Activity of students is taken into consideration in final students evaluation. Theoretical questions are presented in the exact reference to the practice.

**Laboratory classes:** laboratory exercises are conducted in laboratory groups. During the classes, a connection of the measuring system is performed, the performance of indicated measurements, preparation of measurement results and preparation of a report. In addition, an individual design and assembly of uncomplicated printed circuit boards is performed.

### Bibliography

#### Basic

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- Z. Kulka, M. Nadachowski, Wzmacniacze operacyjne i ich zastosowania cz. 1 i 2 WNT 1983.
- U. Tietze, Ch. Schenk, Układy półprzewodnikowe, WNT, Warszawa 2007.
- J. Zakrzewski, Czujniki i przetworniki pomiarowe, Wyd. Politechniki Śląskiej, Gliwice 2004.
- J. Rydzewski, Pomiary oscyloskopowe, WNT, Warszawa, 2007.
- K. Booth, Optoelektronika, WKiŁ, Warszawa, 2001.

#### Additional

- J. Jakubiec, J. Roj, Pomiarowe przetwarzanie próbkujące, wyd. Politechniki Śląskiej, Gliwice 2000.
- Denton J. Dailey, Electronic Devices and Circuits, copyright 2001 by Prentice-Hall, Inc., Upper Sadle River, New Jersey 07548, USA. Warszawa 2002.
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- S. Tumański, Technika pomiarowa, WNT 2007.
- W. Kester, Przetworniki A/C i C/A: teoria i praktyka, BTC, 2012.



- W.E. Ciążyński, Rzeczywiste wzmacniacze operacyjne w zastosowaniach, Wyd. PŚ, Gliwice, 2012.
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- L. Hasse, Zakłócenia w aparaturze elektronicznej, Radioelektronik, Warszawa, 1995.
- Aviation Electronics Technician – Basic, NAVEDTRA 14028, 2003.
- [www.electropedia.org](http://www.electropedia.org).

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	70	3,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/exam)	55	2,0