



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Circuits theory

### Course

Field of study

Electrical engineering

Area of study (specialization)

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Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

Tutorials

30

Projects/seminars

Other (e.g. online)

### Number of credit points

6

### Lecturers

Responsible for the course/lecturer:

D.Sc. Leszek Kasprzyk

Responsible for the course/lecturer:

### Prerequisites

Knowledge of mathematics and physics at the high school level. Ability to understand and interpret the transmitted messages and effective self-education in the field related to the chosen field of study.

### Course objective

Introduction to physical quantities and basic laws and theorems in the field of direct current electric circuits and sinusoidal alternating. Knowledge of analytical methods for calculating electrical circuits in steady state.

### Course-related learning outcomes

Knowledge

The student has knowledge about electrical components and systems.

Knows the basic quantities and laws regarding electric and magnetic fields.

He knows the methods of electrical circuits analysis (DC circuits, single and three-phase alternating current and magnetically coupled circuits).



### Skills

Is able to apply knowledge of the theory of electrical circuits necessary to determine the parameters and signals of electrical circuits such as voltages, currents, impedances, powers, energies etc.

He can obtain information from literature and the Internet, work individually, solve problems in the field of electrical circuit theory.

### Social competences

Is able to think and work in an entrepreneurial manner in the area of the basics of electrical engineering

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified during an exam consisting of 5-10 (open) equally scored questions. Passing threshold: 50% of points. Final issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system or through the Moodle system.

The skills acquired during the classes are verified on the basis of the final test, consisting of 3-4 equally scored tasks and on the basis of activity during the classes. The pass threshold: 50% points.

The skills acquired during the laboratory classes are verified on the basis of a colloquium consisting of 3-4 equally scored tasks and on the basis of activity during the classes. The pass threshold: 50% points.

### Programme content

The lecture: Basic quantities and laws of electric and magnetic field (magnetic and electric flux induction and density, Faraday electromagnetic induction phenomenon), environment and electrical signals and their classification, basic concepts of concentrated and distributed electrical circuits, circuit elements, principles of determination the voltage and current directions, laws of electrical circuits, methods of analysis of DC and sinusoidal alternating current circuits (Kirchhoff's law method, mesh currents, nodal potentials), peripheral theorems (including Thevenin and Norton), active, reactive and apparent power, reactive power compensation, energy in electrical circuits, matching the receiver to the source for maximum power, magnetically coupled circuits, voltage and current resonance, power and energy measurements in electrical circuits. Methods of analysis of DC and 1-phase alternating sinusoidal current circuits in steady state.

Exercises: determination of total resistance and impedance, Kirchhoff's law method, superposition principle / method, matching the receiver to the source for maximum power, method of mesh currents and nodal potentials, Thevenin and Norton theorem / method, determination of active, reactive and apparent power, compensation of reactive power, voltage and current resonance, magnetically coupled circuits.

### Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board, initiating discussions during the lecture. Additional materials are placed in the Moodle system.



Auditorium exercises: solving tasks related to the basics of electrical engineering on the board, discussions and comments on how to solve tasks, and self-performance of tasks in the Moodle system.

## Bibliography

### Basic

1. Bolkowski S., Teoria obwodów elektrycznych, WNT, Warszawa 2015 (any issued)
2. Krakowski M., Obwody liniowe i nieliniowe, PWN, Warszawa 1999
3. Kurdziel R., Podstawy elektrotechniki, WNT, Warszawa 1973

### Additional

1. Bolkowski S., Brociek W., Rawa H., Teoria obwodów elektrycznych. Zadania., WNT, 2015
2. Czarnywojtek P., Kozłowski J., Machczyński W., Zbiór zadań z podstaw elektrotechniki. Obwody liniowe prądu stałego i sinusoidalnego, WPWSZ, 2007
3. Szabatin J., Śliwa E., Zbiór zadań z teorii obwodów, WPW, 2008
4. Cichocki A., Zbiór zadań z teorii obwodów, WPW, 1978
5. Cichocki A., Mikołajuk K., Osowski S., Trzaska Z., Zbiór zadań z teorii obwodów, WPW, 1981

## Breakdown of average student's workload

	Hours	ECTS
Total workload	155	6,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for classes, preparation for tests/exam, homeworks) <sup>1</sup>	80	3,0

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