



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Circuit theory

### Course

Field of study

Electrical engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

20

Laboratory classes

Other (e.g. online)

Tutorials

20

Projects/seminars

### Number of credit points

6

### Lecturers

Responsible for the course/lecturer:

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Engineering

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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

Has knowledge of electrical components and systems.

He knows the basic quantities and laws of electric circuits.

He knows the methods of analyzing electrical circuits (direct current, alternating current and magnetically coupled circuits).

#### Skills

He can apply the knowledge of the theory of electric circuits, necessary to determine the parameters and signals of electric circuits such as: voltages, currents, impedances, powers, energies, etc.

Is able to obtain information from literature and the Internet, work individually, independently solve tasks in the field of the theory of electric circuits.

He can correctly indicate instruments for measuring electrical quantities.

#### Social competences

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

Understands various aspects and effects of an electrical engineer activity.

### 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.

### Programme content

The lecture: Basic quantities and laws of electric and magnetic field, 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., Mikołajuk K., Osowski S., Trzaska Z., Zbiór zadań z teorii obwodów, WPW, 1981
5. Jajczyk J., Stein Z., Zielińska M.: The problems of reactive power compensation in low-voltage network of an industrial plant provided with asymmetric receivers Poznań University of Technology. Academic Journals Electrical Engineering Issue 64 ISSN 1897-0737 V Published by Poznań University of Technology(2010). pp. 17-27.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	155	6,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for classes, preparation for tests/exam, homeworks) <sup>1</sup>	95	4,0

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