COURSE DESCRIPTION CARD - SYLLABUS

Course name
Circuits theory [N1Eltech1>TO1]

Course

Field of study
Electrical Engineering

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
20

Laboratory classes
0

Other
0

Tutorials
20

Projects/seminars
0

Number of credit points

6,00

Coordinators

dr inż. Jarosław Jajczyk
jaroslaw.jajczyk@put.poznan.pl

Lecturers

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 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:

The knowledge acquired during the lecture is verified during an exam consisting of several dozen test questions and 3-5 open questions with various points. Passing threshold: 50% of points. Assessment issues, on the basis of which questions are developed, will be sent to students by e-mail using the university e-mail system or via the Moodle system.
The skills acquired during practical classes are verified on the basis of a final test, consisting of 3-4 tasks scored differently depending on their level of difficulty and on the basis of activity during classes. Passing threshold: 50% of points.

Programme content

Laws and methods relating to the theory of electric circuits in the field of steady states for direct current and single-phase alternating current circuits.

Course topics

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
4. Bolkowski S., Brociek W., Rawa H., Teoria obwodów elektrycznych. Zadania., WNT, 2015
5. Bartkowiak R. A., Electric circuit analysis, John Wiley & Sons, New York 1985
Additional
1. Czarnywojtek P., Kozłowski J., Machczyński W., Zbiór zadań z podstaw elektrotechniki. Obwody liniowe prądu stałego i sinusoidalnego, WPWSZ, 2007
2. Szabatin J., Śliwa E., Zbiór zadań z teorii obwodów, WPW, 2008
3. Cichocki A., Mikołajuk K., Osowski S., Trzaska Z., Zbiór zadań z teorii obwodów, WPW, 1981

4. Rutkowski J., Circuit theory, The Publishing House of the Silesian University of Technology, Gliwice 2006.
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	160	6,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	100	4,00