COURSE DESCRIPTION CARD - SYLLABUS

Course name

Selected issue of electrical engineering

Course

Field of study

Electrical Engineering

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

Second-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

15

Projects/seminars

0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

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Wydział Automatyki, Robotyki i Elektrotechniki

ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

The student starting this subject should have knowledge of mathematics, physics and circuit theory at the first level. He should also be able to obtain information from specified printed and electronic sources.

Course objective

Providing students with knowledge about: passive and active crosses (including electric filters), non-linear elements and circuits (including magnetic circuits), ferroresonance phenomena, signals and their flow theory, circuit diagrams, signal graphs and structural matrices. Understanding in-depth analytical methods for calculating electrical circuits.

Course-related learning outcomes

Knowledge

1. Has knowledge of modeling methods and analytical and numerical methods for analyzing electrical circuits (with linear and non-linear elements, four-terminal).

2. Has knowledge of development trends in electrical engineering.

3. Has advanced knowledge about electric filters

4. Knows selected issues regarding electromagnetic interactions.

Skills

1. Is able to apply knowledge of the in-depth theory of electrical circuits necessary to determine the parameters of electrical circuits such as: attenuation, displacement, wave impedance, static and dynamic resistance, transmittance.

2. Has the ability to obtain specialized information from literature and the Internet. He can work individually and in a team, independently and collectively solve tasks in the field of in-depth theory of electrical circuits.

Social competences

1. Understands the importance of knowledge in solving cognitive and practical problems in the field of electrical engineering.

2. Is aware of the need for self-development in the field of electrical engineering.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired as part of the lecture is verified on the written exam of in-depth theory on selected issues of electrical engineering. The exam consists of 5-7 questions. Passing threshold: 50% of points. The issues on the basis of which questions are prepared will be sent to students by e-mail using the university e-mail system.

Skills acquired as part of the tutorial classes are verified on the basis of the final test taking place during the last class and consisting of 3-5 tasks differently scored depending on the degree of their difficulty. It is possible to get extra points for activity during classes, and especially for: proposing to discuss additional aspects of the issue, the effectiveness of applying the acquired knowledge when solving a given problem, solving additional tasks. Additional points are a maximum of 10% of the final grade.

Programme content

Lecture: signal flow block diagrams, creation, transformation and simplification of block diagrams, determination of transmittance, Mason graphs, graph reduction rules, cascade and parallel connections, graph branch inversion, passive and active crosses, quadruple equations, conjunction quadruple, quadruple parameters, frequency filters passive and active, T, Pi and X filters, band filters, DC and AC nonlinear circuits, methods of analysis, unbranched and branched magnetic circuits, solving magnetic

circuits, nonlinear circuits with ferromagnetic elements, ferroresonance phenomena, vibrations in nonlinear systems.

Tutorials: creating and simplifying block diagrams of signal flow in electrical circuits, creating and simplifying signal graphs for electrical circuits, solving analytical and graphic methods of DC and AC electric circuits with nonlinear elements, determining the parameters of low-pass, high-pass, band-pass and blocking filters.

Teaching methods

Lecture: multimedia presentation (drawings, photos, animations) supplemented with examples given on the board, initiating discussions during the lecture.

Tutorials: solving sample tasks on the board, discussions and comments on how to solve problems.

Bibliography

Basic

1. Kurdziel R.: Podstawy elektrotechniki, WNT, Warszawa 1973.

2. Bolkowski S.: Teoria obwodów elektrycznych, WNT, Warszawa 2008.

3. Szabatin J., Śliwa E.: Zbiór zadań z teorii obwodów. Część 2, Wydawnictwo Politechniki Warszawskiej, Warszawa 2015.

4. Mikołajuk K., Trzaska Z.: Zbiór zadań z elektrotechniki teoretycznej, WNT, Warszawa 1978.

Additional

1. Krakowski M.: Elektrotechnika teoretyczna, PWN, Warszawa 1995.

2. Chua L. O., Desoer C. A., Kuh E. S.: Linear and nonlinear circuits, McGraw-Hill Inc., New York 1987.

3. Jastrzębska G., Nawrowski R.: Zbiór zadań z podstaw elektrotechniki, Wydawnictwo Politechniki Poznańskiej, Poznań 2000.

Breakdown of average student's workload

	Hours	ECTS
Total workload	105	4,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for tutorials, preparation for test, preparation for exam) [1]	50	2,0

[1] delete or add other activities as appropriate