COURSE DESCRIPTION CARD - SYLLABUS

Course name
Electrical Engineering [S2Elmob1>Eltech]

Course

Field of study
Electromobility

Year/Semester
1/1

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
0

Other (e.g. online)
0

Tutorials
30

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

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Prerequisites

Student starting this subject should have knowledge of mathematics, physics and circuit theory at the first-cycle level. He should also have the ability to obtain information from indicated printed and electronic sources.

Course objective

Providing students with knowledge and practical skills in the field of: nonlinear elements and circuits, methods of analyzing transient states of linear RLC systems using the Laplace transform. To familiarize the student with the basic methods of synthesizing electrical circuits and systems. Acquiring the ability to use the state variable method in the analysis of stationary and non-stationary electrical circuits. Learning in-depth methods of calculations and measurements in electrical circuits. The use of modern IT tools to support computational processes in electrical engineering.

Course-related learning outcomes

Knowledge:
Has in-depth and structured knowledge in the field of analysis and synthesis of circuits and low- and high-voltage installations of hybrid and electric vehicles, including traction vehicles

Skills:
Is able to use appropriate analytical, simulation and experimental methods when determining the functionality and design of electric vehicle systems and systems, having previously assessed their usefulness and limitations, as well as adapting them to the specificity of the problem or the need to take into account unpredictable operating conditions

Social competences:
Understands that in the field of technology, knowledge and skills devalue quickly, which requires constant supplementation

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Tutorials: The skills acquired during accounting classes are verified on the basis of two tests (in the middle of the semester and during the last classes). Colloquia consist of 2-4 tasks. Passing threshold: 50% of points.

Programme content

Tutorials: Solving DC and AC electric circuits with nonlinear elements using analytical and graphical methods. Conditions for the feasibility of immittance in the class of passive two-way devices. Synthesis of passive dual circuits using Cauer and Foster methods. Analysis of transient states in electrical circuits using the operator method with the application of basic laws, theorems and analysis methods of circuit theory. Application of the state variable method in the analysis of stationary and non-stationary electrical circuits. Referring the above-mentioned content to applications in engineering calculations performed as part of the design and installation of installations in electric and hybrid vehicles, including traction vehicles. Use of software supporting engineering calculations (MATLABSimulink).

Teaching methods

Solving sample tasks on the board or using multimedia presentation devices, using computer-aided software (MATLABSimulink) to perform calculations and visualize results, discussions and comments on how to solve tasks.

Bibliography

Basic:
1. Bolkowski S., Teoria obwodów elektrycznych, WNT, Warszawa 2015
2. Kurdziel R.: Podstawy elektrotechniki, WNT, Warszawa 1973.
3. Szabatin J., Śliwa E.: Zbiór zadań z teorii obwodów. Część 2, Wydawnictwo Politechniki Warszawskiej, Warszawa 2015.
4. Rawa H., Bolkowski S., Brociek W.: Teoria obwodów elektrycznych. Zadania., PWN, Warszawa 2019.
5. Frąckowiak J., Nawrowski R., Zielińska M.: Teoria obwodów. Laboratorium, Wydawnictwo Politechniki Poznańskiej, Poznań 2017.
6. Bartkowiak R. A., Electric circuit analysis, John Wiley & Sons, New York 1985.
7. Chua L. O., Desoer C. A., Kuh E. S.: Linear and nonlinear circuits, McGraw-Hill Inc., New York 1987
8. Robert L. Boylestad, Introductory Circuit Analysis, Pearson.
9. John O'Malley, Theory and problems of Basic circuit analysis, McGraw-Hill.
10. John Bird, Electrical circuit theory and technology, Newnes.
11. J.W. Nilsson & S.A. Riedel, Electric Circuits, 8th edition, Prentice Hall, 2008.

Additional:
1. Krakowski M.: Elektrotechnika teoretyczna, PWN, Warszawa 1995.
2. Jastrzębska G., Nawrowski R.: Zbiór zadań z podstaw elektrotechniki, Wydawnictwo Politechniki Poznańskiej, Poznań 2000.
3. Czarnywojtek P., Kozłowski J., Machczyński W.: Teoria obwodów elektrycznych w zadaniach, Wydawnictwo Uczelni PWSZ w Kaliszu, Kalisz 2008
4. Mikołajuk K., Trzaska Z.: Zbiór zadań z elektrotechniki teoretycznej, WNT, Warszawa 1978.
5. Rutkowski J., Circuit theory, The Publishing House of the Silesian University of Technology, Gliwice 2006.

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	25	1,00