COURSE DESCRIPTION CARD - SYLLABUS

Course name
Circuit theory [S1EiT1>TO]

Course

Field of study
Electronics and Telecommunications

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
60

Laboratory classes
0

Other
0

Tutorials
30

Projects/seminars
0

Number of credit points

6,00

Coordinators

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Lecturers

Prerequisites

The student starting this course should have systematized knowledge of mathematical analysis, algebra, trigonometry and knowledge of physics. He should know the limits of his own knowledge and abilities, uderstand the need for ongoing education.

Course objective

Understanding of electromagnetic phenomena in circuit components and networks as objects transfering energy and signals. Ability to describe these phenomena and to analyze the circuit in order to get knowledge and for the practical needs of the research and design of electronic and telecommunications systems.

Course-related learning outcomes

Knowledge:
1. Knows the basic laws in circuit theory: voltage and current Kirchoff"s laws and superposition theory .
2. Knows the characteristics and basic branch equations of linear and nonlinear elements.
3. Knows the basic circuit analysis methods. In particular is familiar with method of complex numbers and the method of Laplace transform.

4. Knows the two-port description of circuit using a matrices Z, Y, H, A, and S.
5. Knows basic computer tools helpful in circuit analysis and simulation.

Skills:
1. Is able to obtain the information from literature and other sources; is able to integrate obtained information, interprete it, draw conclusions and justify opinions.
2. Is able to use various analytical methods to formulate and solve problems in circuit theory.
3. Is able to solve typical tasks and problems related to the analysis of linear and nonlinear electrical circuits.
4. Is able to determine the transient response of a simple system.

Social competences:
1. Is able to self-learning (textbooks, computer programs).
2. Behaves actively in class, asks questions, knowingly uses the contact with the teacher (eg consultations).

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Knowledge acquired during the lecture is verified on the basis of an exam. The exam lasts 100-120 minutes and consists of 10-15 tasks with various points. Passing threshold - 50% of points.
Skills acquired as part of the tutorials are verified by
-one 90-minute test carried out at the end of tutorials (50% of points). Exact date is set with the students. Test consist of 3-5 tasks differently scored depending on their level of difficulty.
- 6-10 short tests during tutorials, checking preparation for classes based on previous classes and lectures
- homeworks on ekursy system
The final grade is influenced by the final test, preparation for classes, homework, individual solving tasks at the blackboard during classes, and activity.
Allocation of points:
end test 50%
homeworks 20%
current tests 30%
Passing threshold: 50% of points
additional activities to improve the grade: activity/solving tasks at the blackboard - max 20%

Programme content

The Circuit Theory lecture covers the rules and methods for analyzing electrical circuits. It presents the principles of circuit analysis for both AC and DC circuits, including steady-state and transient analysis.

Course topics

Lecture:
1. Basic laws in circuit theory: Kirchoff"s voltage and current laws, real circuit and its mathematical model.
2. Linear and nonlinear passive and active elements of analog circuits.
3. Steady state AC circuits - complex numbers method, phasor diagrams.
4. Basic principles, theorems and methods in circuit analysis.
5. Resonant and coupled circuits.
6. Linear circuits with periodic signals.
7. Circuit analysis with non-linear elements.
8. Transients, methods of time and frequency analysis (Laplace transform).
9. Two-port networks and their description by means of matrices: Z, Y, H, A etc. and S.
Tutorials:
1. Kirchoff"s voltage and current laws.
2. Steady-state AC circuits - complex numbers method.
3. Basic methods of circuit analysis.
4. Resonant and coupled circuits.
5. Linear circuits with periodic signals.

6. Transients, Laplace transform.

Teaching methods

Lecture: traditional lecture, problem lecture
Tutorials: individual solving of tasks given by the teacher, group work, homeworks

Bibliography

Basic
1. Teoria obwodów elektrycznych. S. Bolkowski, WNT, 2012;
2. Teoria obwodów elektrycznych - zadania. S.Bolkowski, W. Brociek, H. Rawa:, WNT 2015;
Additional
1. Podstawy teorii obwodów. Tom 1,2,3, J.Osiowski, J.Szabatin, WNT, Warszawa, 1992, 1995, 2000;
2. Teoria obwodów, cz. I i II. M. Tadeusiewicz, Wydawnictwo PŁ, Łódź, 2003, 2002;
3. Teoria obwodów w zadaniach. Andrzej Hildebrandt, Henryk Sołtysik, Andrzej Zieliński, 1977;
4. Zadania z teorii obwodów, Z. Filipowicz: OW PW 2010;
5. Zbiór Zadań z Teorii Obwodów. Część 1/2. , J. Szabatin, E. Śliwa , Wyd. PW, Warszawa, 2003;

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	100	4,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00