COURSE DESCRIPTION CARD - SYLLABUS

Course name
Circuit theory

Course

Field of study
Automatic Control and Robotics

Year/Semester
1/2

Area of study (specialization)
-

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
english

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
45

Laboratory classes

Other (e.g. online)

Tutorials
30

Projects/seminars

Number of credit points

7

Lecturers

Responsible for the course/lecturer:
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Przemysłowej, ul. Piotrowo 3A, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

High school level mathematics and physics news. Knowledge of the basic quantities describing electrical circuits. The ability to understand and interpret the messages communicated and effective self-education in the field related to the selected field of study.

Course objective

Getting to know the theoretical and practical problems of electrical engineering. Acquiring the ability to analyze selected electrical circuits of direct and alternating current.

Course-related learning outcomes

Knowledge

1. has knowledge of the description and analysis of complex quantities in electrical circuits,

2. has knowledge of the description, analysis and methods of signal processing in the time and frequency domains,

3.has ordered, theoretically founded general knowledge in the field of the theory of electric circuits and electrical engineering of direct and alternating current (including three-phase).

Skills

1. can use properly selected methods and measuring devices and measure the relevant signals and on their basis determine the static and dynamic characteristics of automation components and obtain information about their essential properties,

2. is able to build, run and test a simple electronic and electromechanical system.

Social competences

1. is aware of the need for a professional approach to technical issues, scrupulous familiarization with the documentation and environmental conditions in which the devices and their components can operate; is ready to comply with the principles of professional ethics and require it from others, respect for the diversity of views and cultures.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- assessment of the knowledge and skills demonstrated in the problem-based written exam (it is allowed to conduct the test in an electronic form on the university's educational platform eKursy).

Auditorium exercises:

- tests and 2 written tests (tests: 7th and 14th week of classes),

- rewarding ongoing bonuses for activity and creativity in solving set tasks.

Assessment rules (for credit for the lecture and auditorium exercises):

5.0 - over 90% of points

4.5 - 80% -90% points

4.0 - 70% -80% points

3.5 - 60% -70% points

3.0 - 50% -60% points

2.0 - less than 50% of points

Programme content

Lecture.

Basic concepts of an electric circuit, mathematical models of circuit elements, basic laws of electromagnetic field, rules of voltage and current arrows, laws of electric circuits, solving DC circuits - methods: mesh and nodal potentials, Thevenin and Norton theorems, work and power of electric current, instantaneous value , average and effective current and voltage. Sinusoidal alternating current circuits - complex number method, vector plots, active, reactive and apparent power, RLC circuit analysis, power factor improvement, voltage and current resonance, transients in electrical circuits, three-phase circuits, non-sinusoidal periodic circuits, quadrants and filters.

Tutorials

Solving basic tasks in DC circuits using the laws, theorems and circuit methods, calculating power in a circuit, power balance, calculating meter indications. Solving tasks in RLC circuits with sinusoidal excitations - symbolic method, calculation of active, reactive and apparent power, solving electrical circuits in the state of voltage and current resonance. Solving electrical circuits in transient states - classical method. Solving three-phase circuits, calculating power - Aron circuit.

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board and with the use of simulation software, initiating discussions during the lecture. Additional materials are placed in the eCourses system.

Auditorium exercises: solving problems related to the basics of electrical engineering on the blackboard, discussions and comments on the methods of solving the tasks and performing tasks independently in the e-courses.

Bibliography

Basic

1. Robert L. Boylestad, Introductory Circuit Analysis, Pearson.

2. John O'Malley, Theory and problems of Basic circuit analysis, McGraw-Hill.

3. John Bird, Electrical circuit theory and technology, Newnes.

4. Czarnywojtek P., Kozłowski J., Machczyński W.: Zbiór zadań z podstaw elektrotechniki, Wydawnictwo PWSZ, Kalisz, 2007.

Additional

1. J.W. Nilsson & S.A. Riedel, Electric Circuits, 8th edition, Prentice Hall, 2008.

2. Bolkowski S., Brociek W., Rawa H.: Teoria obwodów elektrycznych. Zadania, WNT, Warszawa 1995.

Breakdown of average student's workload

	Hours	ECTS
Total workload	175	7,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam) [1]	100	4,0

[1] delete or add other activities as appropriate