COURSE DESCRIPTION CARD - SYLLABUS

Course name
Circuit theory [S1AiR1E>TO2]

Course

Field of study
Automatic Control and Robotics

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Information in the field of mathematics and physics at the level of the first year of study. Knowledge of the basic quantities describing electrical circuits. The ability to understand and interpret the messages conveyed and effective self-education in the field related to the selected field of study.

Course objective

Getting to know the theoretical problems of electrical engineering in practice. Acquiring the ability to analyze and conduct measurements (research experiments) of selected electrical circuits of direct and alternating current.

Course-related learning outcomes

Knowledge:
The graduates has an advanced knowledge and understanding of selected facts, objects and phenomena and the methods and theories relating to them that explain the complex relationships between them; he has a basic general knowledge of mathematics including algebra, geometry, analysis, probabilistic and elements of discrete mathematics and logic, including mathematical methods and numerical methods necessary to:

▪ describe and analyse the properties of linear and basic non-linear dynamic and static systems,
▪ the description and analysis of complex numbers,
▪ the description of random processes and uncertain quantities,
▪ the description and analysis of combinatorial and sequential logic systems,
▪ description of control algorithms and stability analysis of dynamic systems,
▪ the description, analysis and methods of signal processing in the time and frequency domain,
▪ numerical simulation of dynamic systems in the continuous and discrete time domain [K1_W1 (P6S_WG)].
Has well-ordered, theoretically grounded general knowledge in the field of electric circuit theory and DC and AC (including three-phase) electrical engineering [K1_W6 (P6S_WG)].
Skills:
Be able to use appropriately selected methods and measuring instruments and measure relevant signals and, on the basis of these, determine the static and dynamic characteristics of automation components and obtain information on their basic properties [K1_U14 (P6S_UW)].
Is able to build, commission and test a simple electronic and electromechanical system [K1_U15 (P6S_UW)].
Social competences:
The graduate is aware of the need for a professional approach to technical issues, meticulous familiarization with the documentation and environmental conditions in which the equipment and its components can operate. The graduate is ready to observe the rules of professional ethics and to demand it from others, to respect the diversity of opinions and cultures [K1_K5 (P6S_KR)].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Laboratory exercises:
- checking knowledge in the form of written or practical tests,
- assessment of knowledge and skills related to the implementation of the exercise task on the basis of an individual report on the performed exercise,
- rewarding the aesthetic diligence of prepared reports and tasks as part of self-study.
The final grade is based on the average of the points scored in the following range:
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 - below 50% of points

Programme content

The module program covers the following topics:
1) Basic laws, phenomena and theorems in direct and alternating current electrical circuits,
2) Three-phase systems,
3) Electrical crossovers and filters.

Course topics

Laboratory:
Principle of superposition, proportionality and reciprocity in electrical circuits. Thevenin and Norton theorem. Real source, matching receiver to source at maximum power. RLC elements in a sinusoidal alternating current circuit. Resonance in series and parallel circuit. Correcting the power factor. Measurement of active power in three-phase systems. Frequency analysis of LC-type quadripoints. Rectifiers and filtering systems.

Teaching methods

Laboratory: performing laboratory exercises in teams (preparation of the stand, building measuring systems, carrying out experiments) with the help and supervision of the teacher.

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. Frąckowiak J., Nawrowski R., Zielińska M.: Laboratorium Elektrotechniki Teoretycznej, Wydawnictwo Politechniki Poznańskiej 2011.
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	60	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)	30	1,00