COURSE DESCRIPTION CARD - SYLLABUS

Course name
Simulation methods of testing the electronic circuits [S1MwT1>G-SMBUE]

Course

Field of study
Mathematics in Technology

Year/Semester
4/7

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
15

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Student starting this course should have: - basic knowledge in the scope of electrotechnics, electronics, metrology and semiconductors; - ability of the efficient self-education, clarify and understand the area concerned with the module; - awareness of the necessity of competence broadening and ability to show readiness to work as a team.

Course objective

The project aims to get: 1. Skills in the scope of analysis of the electronic analog and digital circuits with application of computer assistance to simulate these circuits. 2. Specialistic knowledge from analog and digital electronic circuits.

Course-related learning outcomes

Knowledge
•knowledge about select electronics circuits analyses method;
•knowledge about the principles and techniques of measurement signals acquisition and processing for the modern applications in industry and biomedical engineering;
•knowledge about the application areas and potential of the modern measurement systems.

Skills
•ability to design creatively the modern measurement systems, using the possibilities offered by presenty available technologies, taking into account the limitattions of the knowledge and technique status.
Social competences
•the ability to precisely identify the problem, the explanation of which requires literature studies or consultation with technical specialists.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:
knowledge acquired during the lecture is verified during the written test during the last class. Passing threshold: 51% of the total number of points.

Laboratory:
the skills acquired in the laboratory exercises are verified on the basis of reports made by students at home after the exercises. Exercises take place in a parallel variant. During laboratory classes, students' preparation for the exercise is checked. Completion of laboratory classes requires the performance of all exercises and individual performance of reports indicated by the teacher.

Projects:
- assessment of knowledge and skills related to the implementation of a group or individual project;
- evaluation of technical documentation related to the completed project.

Programme content

Lecture
Discussion of various methods and aspects of solving problems in the field of designing and simulating electronic circuits. Discussion of issues in the field of:
- Design and analysis of properties of the selected electronic systems and carrying out the simulation studies using specialized programming environments.
- Making the circuit diagrams by the use of Tina-TI or LTspice environment.
- Application of the Tina-TI environment for the DC, AC, frequency and time analysis of electronic circuits.

Laboratory
Familiarization with safety rules during laboratory classes. Designing and testing simple general-purpose electronic circuits in numerical simulation studies.

Design
Creation and experimental testing of simple general purpose electronic circuits. Comparison of results of experimental research and numerical simulation research. Preparation of appropriate technical documentation of the project.

Teaching methods

Lecture:
multimedia presentation (including: figures, photos, animations, videos) supplemented with examples given on the board, especially calculation. Considering various aspects of the presented issues, including: economic, ecological, legal and social. Introducing a new topic preceded by a reminder of related content, known to students from other subjects.

Laboratory:
performing laboratory exercises individually or in small teams (building electronic and measurement systems in a simulation program, performing experiments) with the help and under the supervision of the teacher.

Projects:
presentation illustrated with examples given on a whiteboard or computer monitors, and performing tasks given by the lecturer - practical exercises.

Bibliography

Basic
1. M. Ghausi, Electronic Circuits: Devices, Models, Functions, Analysis, and Design, D.Van Nostrand Comp., New York 1971.
2. U. Tietze, Ch. Schenk, Układy półprzewodnikowe, WNT, Warszawa 2009.
3. K. Baranowski, A. Welo, Symulacja układów elektronicznych PSPice, EDU-MIKOM, Warszawa 1996.
Additional
1. Tina-TI video training series https://training.ti.com/tina-ti-video-training-series
2. K. M. Noga, M. Radwański, Multisim. Technika cyfrowa w przykładach, BTC, Legionowo 2009.

Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,00