Computer engineering design - course description

General information

Course name	Computer engineering design
Course ID	06.2-WE-ELEKTP-CED-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Electrical Engineering
Education profile	academic
Level of studies	First-cycle Erasmus programme
Beginning semester	winter term 2021/2022

Course information

Semester	5
ECTS credits to win	5
Course type	optional
Teaching language	english
Author of syllabus	• dr hab. inż. Janusz Kaczmarek, prof. UZ

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Project	30	2	-	-	Credit with grade
Laboratory	30	2	-	-	Credit with grade
Lecture	15	1	-	-	Credit with grade

Aim of the course

- To familiarize students with the basics of designing electronic devices using EDA software
- Shaping skills in editing schematic diagrams and performing computer simulation of electronic circuits
- To familiarize students with basic techniques of designing and creating a software of computer measurement systems using specialized graphical programming environments
- Shaping skills in the field of developing software using LabVIEW

Prerequisites

- Electronics
- Metrology
- Principles of programming

Scope

Methodology of designing an electronic circuit using EDA system. Basic concepts on capturing a circuit as a schematic diagram: netlist, wires and buses. Component library structure: part, symbol, package and padstack. Printed Circuit Board designing using layout editor. Methods of placing components and routing traces. Designing one, two and multilayer PCB. Automatic routing of PCB traces with an autorouter tool. Design rule check in EDA systems.

Computer simulation of electronic circuits. SPICE simulation fundamentals. Types of simulation analysis: nonlinear dc, small signal ac, transient, sensitivity and distortion. Models of electronic devices. Analysis of simulation results.

Producing design documentation and CAM files in EDA systems.

Basic knowledge of the virtual instruments. Basic definitions. Characteristic of integrated software environments to designing the software for virtual instruments and measurement systems.

Introduction to programming in LabVIEW. Concept of the graphical programming language G. Building a front panel and block diagram. Basic and composite data types. Controlling program execution with loops and structures: for, while, shift-register mechanism, case, sequence, formula node. Operations on arrays and strings.

Hierarchical programming. Global and local variables. Polling and event-driven programming models. Express technology.

Characteristics of library functions for analysis and processing of measurement signals.

Teaching methods

Lecture: conventional lecture

Laboratory: laboratory exercises, group work

Project: project method, discussions and presentations

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Student knows basic design and creation techniques of computerized measurement systems software with the application of graph specialized programming environments		• an evaluation test	• Lecture
Student has the ability to create software in LabVIEW environment		• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Student has basic knowledge about designing electronic devices using EDA software		• a multiple choice and open questions test • a project • carrying out laboratory reports	• Lecture • Laboratory • Project

Assignment conditions

Lecture – the passing condition is to obtain a positive mark from the final test.

Laboratory – the passing condition is to obtain positive marks from all laboratory exercises to be planned during the semester.

Project - the project documentation and oral presentation

Calculation of the final grade: lecture 30% + laboratory 35% + project 35%

Recommended reading

1. Horowitz P., Hill W., The Art of Electronics, Cambridge University Press, 2015.
2. Wilson P.: The Circuit Designer's Companion, Newnes, 2017.
3. Rymarski Z., Materials technology and construction of electronic circuits. Designing and production of electronic circuits, Wydawnictwo Politechniki Śląskiej, Gliwice, 2000 (in Polish).
4. Dobrowolski A., Under the mask of SPICE, BTC, Warszawa, 2004 (in Polish).
5. Essick J.: Hands-On Introduction to LabVIEW for Scientists and Engineers, Oxford University Press, 2012.

Further reading

Notes

Modified by dr hab. inż. Janusz Kaczmarek, prof. UZ (last modification: 10-07-2021 13:47)