

# Computer-aided design - opis przedmiotu

| Informacje ogólne   |                                                                   |
|---------------------|-------------------------------------------------------------------|
| Nazwa przedmiotu    | Computer-aided design                                             |
| Kod przedmiotu      | 06.5-WE-ELEKTP-CompAid-Des-Er                                     |
| Wydział             | <a href="#">Wydział Informatyki, Elektrotechniki i Automatyki</a> |
| Kierunek            | Elektrotechnika                                                   |
| Profil              | ogólnoakademicki                                                  |
| Rodzaj studiów      | Program Erasmus pierwszego stopnia                                |
| Semestr rozpoczęcia | semestr zimowy 2017/2018                                          |

| Informacje o przedmiocie        |                                                                                         |
|---------------------------------|-----------------------------------------------------------------------------------------|
| Semestr                         | 5                                                                                       |
| Liczba punktów ECTS do zdobycia | 5                                                                                       |
| Typ przedmiotu                  | obieralny                                                                               |
| Język nauczania                 | angielski                                                                               |
| Sylabus opracował               | <ul style="list-style-type: none"><li>dr hab. inż. Janusz Kaczmarek, prof. UZ</li></ul> |

| Formy zajęć  |                                         |                                        |                                            |                                           |                     |
|--------------|-----------------------------------------|----------------------------------------|--------------------------------------------|-------------------------------------------|---------------------|
| Forma zajęć  | Liczba godzin w semestrze (stacjonarne) | Liczba godzin w tygodniu (stacjonarne) | Liczba godzin w semestrze (niestacjonarne) | Liczba godzin w tygodniu (niestacjonarne) | Forma zaliczenia    |
| Wykład       | 30                                      | 2                                      | -                                          | -                                         | Zaliczenie na ocenę |
| Laboratorium | 30                                      | 2                                      | -                                          | -                                         | Zaliczenie na ocenę |
| Projekt      | 15                                      | 1                                      | -                                          | -                                         | Zaliczenie na ocenę |

## Cel przedmiotu

- 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

## Wymagania wstępne

- Fundamentals of electronics
- Fundamentals of programming languages
- Electrical metrology

## Zakres tematyczny

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. Characteristic of library functions for analysis and processing of measurement signals. Express technology.

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

## Metody kształcenia

Lecture: conventional lecture

Laboratory: laboratory exercises, group work

## Efekty uczenia się i metody weryfikacji osiągnięcia efektów uczenia się

| Opis efektu                                                                                                                                                        | Symbole efektów | Metody weryfikacji                                                                                                                                          | Forma zajęć                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Student knows basic design and creation techniques of computerized measurement systems software with the application of graph specialized programming environments |                 | <ul style="list-style-type: none"><li>• kolokwium</li></ul>                                                                                                 | <ul style="list-style-type: none"><li>• Wykład</li></ul>                                          |
| Student has the ability to create software in LabVIEW environment                                                                                                  |                 | <ul style="list-style-type: none"><li>• bieżąca kontrola na zajęciach</li><li>• wykonanie sprawozdań laboratoryjnych</li></ul>                              | <ul style="list-style-type: none"><li>• Laboratorium</li></ul>                                    |
| Student has basic knowledge about designing electronic devices using EDA software                                                                                  |                 | <ul style="list-style-type: none"><li>• projekt</li><li>• test z pytaniami zamkniętymi i otwartymi</li><li>• wykonanie sprawozdań laboratoryjnych</li></ul> | <ul style="list-style-type: none"><li>• Wykład</li><li>• Laboratorium</li><li>• Projekt</li></ul> |

## Warunki zaliczenia

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 35% + laboratory 35% + project 30%

## Literatura podstawowa

1. Khalid S.F., LabWindows/CVI Programming for Beginners. Prentice Hall PTR, 2000.
2. Rymarski Z., Materials technology and construction of electronic circuits. Designing and production of electronic circuits, Wydawnictwo Politechniki Śląskiej, Gliwice, 2000 (in Polish).
3. Dobrowolski A., Under the mask of SPICE, BTC, Warszawa, 2004 (in Polish).
4. Williams T., The Circuit Designer's Companion, Newnes, 2005.

## Literatura uzupełniająca

## Uwagi

Zmodyfikowane przez dr hab. inż. Radosław Kłosiński, prof. UZ (ostatnia modyfikacja: 02-05-2017 14:17)