Computer-aided control systems design - course description

General information

Course name	Computer-aided control systems design
Course ID	06.0-WE-AutP-C-ACSD-Er
Faculty	Faculty of Computer Science, Electrical Engineering and Automatics
Field of study	Automatic Control and Robotics
Education profile	academic
Level of studies	Erasmus programme
Beginning semester	winter term 2017/2018

Course information

Semester	6
ECTS credits to win	5
Course type	optional
Teaching language	english
Author of syllabus	• dr hab. inż. Bartłomiej Sulikowski, 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
Lecture	30	2	-	-	Exam
Laboratory	30	2	-	-	Credit with grade

Aim of the course

- Introduction to computer methods used in control engineeg
- To use Matlab for solving common control engineering problems.
- Developing skills for practical use of automatic control systems synthesis procedures.

Prerequisites

Signals and dynamic systems, Control engineering, Digital control algorithms

Scope

Computer-aided design environments. Survey and classification of existing software packages: Matlab. MathCAD. Mathematica. Integrating the packages with the environment. Basics of programming and data structures. Automatic control systems synthesis using the computer-aided tools.

Matlab Simulink Toolbox. Structure, data exchange with Matlab. Block diagrams design. Linear and non-linear elements. Continuous and discrete elements. Impulsive elements, generators and receivers. Clustering, linearization, equilibrium points setting. Simulation initiation. Design examples in Matlab/Simulink. Intregration Simulation with Real Time Workshop. StateFlow and ControlShell packets.

Physical objects models. Automatic control systems design process. Object model. Design aims. Models types. Mathematical model, discrete and continuous models. Modelling the physical objects. Model accuracy. Model evaluation methods and tools. Tools of model analysis. Application of computer packages to aforementioned topics.

Teaching methods

Lecture, laboratory exercises

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
Can skilfully use modern numerical environments for modeling and synthesis of control systems.		• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Can use numerical software to build and simulate a mathematical model of an electro-mechanical system		• an ongoing monitoring during classes • carrying out laboratory reports	• Laboratory
Is aware of the importance of an adequate mathematical model in the system analysis and synthesis of control systems		• an exam - oral, descriptive, test and other	• Lecture

Assignment conditions

Recommended reading

1. *Matlab/Simulink documentation*. MathWorks, Inc., 2000
2. Franklin G. F., Powell J. D., Workman M. L.: *Digital Control of Dynamic Systems* Addison Wesley;,1998.
3. Ogata K.: *Discrete-Time Control Systems*, Prentice Hall; 1994
4. Shahian B., Hassul M. :*Control System Design Using MATLAB*, Prentice Hall, New Jersey,1993.

5. *Control System Toolbox for Use with MATLAB*. User's Guide. MathWorks, 1992.

Further reading

Notes

Modified by dr hab. inż. Wojciech Paszke, prof. UZ (last modification: 02-05-2020 10:46)