SYLLABUS

Name: ***Control fundamentals (MakAu>SI6CF19)***
Name in Polish:
Name in English: ***Control fundamentals***

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science
Course for department: Silesian University of Technology

Default type of course examination report:

ZAL

Language:

English

Course homepage:

https://platforma2.polsl.pl/rau1/course/view.php?id=422

Short description:

The objective of laboratory classes is to acquire some practice in control system analysis and design using advanced CAD environment, like MATLAB-SIMULINK.

Pre-requisite qualifications: A thorough knowledge of the topics covered in the course in the fourth semester, basic skills in using the MATLAB-SIMULINK environment, possession of basic computer programming skills.

Description:

ECTS: 2
Total workload: 50 hours (contact hours: 35, students' own work hours: 15)

Forms of contact hours:
Laboratory 30h
Other (tests and reports revision, discusion): 5h

Students' own work: preparation for laboratory exercises, writing reports

Set of laboratory exercises:

1. CAD of control systems – Matlab introduction
2. Stability of linear systems
3. Static accuracy
4. Phase-lead and phase-lag compensation
5. Attenuation index and tracking index
6. PID controllers
7. Root locus method
8. Sampled-data systems

Bibliography:

Primary sources:
1. Gessing R.: Control Fundamentals, Wydawnictwo Politechniki Śl., Gliwice 2004.
2. Franklin G.F, J.D. Powell and Emani-Naeini: Feedback control of Dynamic Systems, (Third Edition) Addison-Wesley, 1994
Secondary sources:
1. Phillips CL., Harbor R.D.: Feedback Control Systems (Third Edition) Prentice Hall, 1996.
2. Goodwin G.C., Graebe S.F., Salgado M.E.: Control Systems Design, Prentice Hall, 2001

Learning outcomes:

Course specific learning outcomes.
At the completion of the course, student:
knows methods of description, design, and analysis of simple automatic control systems, including stability and control quality, (execution of the exercise program, laboratory report) K1A_W15.
is able to create a mathematical model of a simple dynamic control system, select the appropriate control structure, types of controllers, apply various tuning methods to estimate parameters, and assess the quality of control by the use of CAD software (execution of the exercise program, laboratory report) K1A_U18.
can understand the importance of expert knowledge and professional experience for effectively solving practical problems in the design of control systems (execution of the exercise program, laboratory report) K1A_K02.

Assessment methods and assessment criteria:

How to obtain credit
1. Attendance at all laboratory exercises is mandatory.
2. Laboratory exercises follow a schedule aligned with the group timetable.
3. The exercises are computer-based and involve using programs for designing and simulating control systems. The basics of the Matlab-Simulink environment are introduced in Exercise 1.
4. The laboratory program consists of seven main exercises (Exercises 2-8), conducted in two-person sections.
5. During the exercises, students apply their knowledge from lectures and board
exercises (5th semester) to solve engineering problems related to control system analysis and synthesis.
6. Each laboratory exercise includes two guide files that outline the exercise program and provide suggestions for obtaining appropriate results.
7. Before each exercise, students must review the guides and acquire the necessary theoretical knowledge.
8. The instructor continuously monitors students' progress throughout the exercises.
9. Upon completing each exercise, students must submit a written report (one per section), graded on a standard scale. The report must be handed in (in paper form) at the beginning of the next laboratory session.
10. To pass the laboratory course, students must receive passing grades for all exercises.
11. The final laboratory grade is the average of the grades from all exercises.

The syllabus is valid from summer semester of academic year 2024/2025 and its content is not subject to change during the semester.

Course credits in various terms:

<without a specific program>

Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	2	2021/2022-L	