COURSE DESCRIPTION CARD - SYLLABUS

Course name
Advanced identification methods for control systems [N2AiR1-ISA>PO1-ZMISA]

Course

Field of study
Automatic Control and Robotics

Year/Semester
1/2

Area of study (specialization)
Intelligent Control Systems

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
elective

Number of hours

Lecture
10

Laboratory classes
20

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Every student attending the subject is expected to have the knowledge and skill in automatic control basics. Every student should also have basic knowledge of nonparametric and parametric identification of simple linear systems, both deterministic and stochastic.

Course objective

To extend student knowledge about system identification with issues concerning multivariable and nonlinear systems. To provide students with the knowledge of control algorithms relying on the models obtianed through system identification and dealing with the identifiability problems in such control systems.

Course-related learning outcomes

Knowledge
[K2_W5]
[K2_W10, K2_W3]
Skills
[K2_U10]
[K2_U21]

[K2_U27, K2_U12]
Social competences
[K2_K4]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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The knowledge gained during lectures is veryfied by the final test consisting of 20-40 closed questions.
The skills acquired during laboratory classes is verified by: written tests, knowledge and skills assessment during excersises made by students, evaluation of the reports, which are prepared individually by students.

Programme content

Identifiability problems of systems described using transfer functions or state-space equations. System identification methods for multiple-input/multiple-output (MIMO) systems: relying on decomposition to MISO or SIMO subsystems and relying on state-space representation - subspace methods. Problem of minimum realization and Hankel matrix decomposition. Identification algorithms for nonlinear systems. Control methods utilising system identifocation and identifiability problems in such systems.

Course topics

none

Teaching methods

1. Lectures: interactive presentation supplemented by examples calculated on the blackboard. Students are encouraged to active participation in the classes.
2. Laboratory classes: practice excercises performed by students on computers, according to the instruction given by a teacher. Students are encouraged to independent thinking, analysis and solving problems arising in advanced system identification.

Bibliography

Basic
1. Królikowski A., Horla D., Ziętkiewicz J., Identyfikacja obiektów sterowania, Wydawnictwo Politechniki Poznańskiej, 2017
2. Juang J. N., Applied system identification, Englewood Cliffs: Prentice Hall, 1994
3. T. Soderstrom, P. Stoica, Identyfikacja systemów, PWN, 1997
Additional
1. Astrom K. J., Wittenmark B., Adaptive control, Addison Wesley, 1998
2. Wachel P., Identyfikacja i agregacyjne modelowanie nieliniowych systemów dynamicznych, EXIT, 2017.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	30	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	1,50