COURSE DESCRIPTION CARD - SYLLABUS

Course name

Zaawansowane metody identyfikacji systemów automatyki

Course

Field of study

Automatyka i robotyka

Area of study (specialization)

Inteligentne systemy automatyki

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

2/2

Profile of study

general academic

Course offered in

polski

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

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Wydział Automatyki, Robotyki i Elektrotechniki

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Responsible for the course/lecturer:

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

1. Has an extended knowledge knowledge of linear system identification [K2_W5]

2. Knows system identification problems appearing in adaptive control systems and solutions [K2_W9]

3. Has an extended knowledge of system identification according also to nonlinear and multivariable systems and the main knowledge about advanced control methods for which models are provided by using identification methods [K2_W7]

Skills

1. Is able to identify advanced systems, also nonlinear and multivariable or working in a control system.

2. Can search the literature, in both Polish and English language, to acquire solutions for specified problems of system identification [K2_U21]

Social competences

1. Understands the necessity of continuous developing and searching for solution in identification of particular systems working in specified environment and conditions, e.g., in an adaptive control system [K2_K1, K2_K4]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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.

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	90	3,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for laboratory classes, preparation for tests/final test, working with CAS software, reports preparation) [1]	40	2,0

[1] delete or add other activities as appropriate