GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Modelling and Identification, PG_00057474		
Field of study	Automation, Robotics and Control Systems		
Date of commencement of studies	February 2027	Academic year of realisation of subject	2026/2027
Education level	second-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Control Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Michał Grochowski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	15.0	0.0	45

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	10.0	20.0	75

Subject objectives

Presentation of advanced modern methods of systems modeling and estimation of their parameters. Analytical, fuzzy and neural technology will be presented.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U06] is able to plan the preparation and execution of experiments, measurements and computer simulations to evaluate the performance of automation and robotics tasks	Investigates simulation and experimental behavior of dynamic objects. Selects appropriate analytical and simulation methods to solve automation and robotics tasks.	[SU1] Assessment of task fulfilment
[K7_W14] has knowledge of mathematical modelling, identification, optimisation, decision suport decision-making and control, knows methods of implementing advanced control algorithms in industrial equipment	Models dynamic objects and control systems. Selects an appropriate method for modeling, identifying and verifying objects and control systems	[SW3] Assessment of knowledge contained in written work and projects

Subject contents

Course content – lecture

LECTURE Repetytorium basis of modeling and identification, range of degree studies. Fundamentals of probabilistic methods. Basics of mathematical modeling of real objects (statics and dynamics of processes). Elements of the verification models. Problems of optimal planning of experiments. Identification of the parameters on the basis of models (size and immeasurable nieobserwowalne). Identification of transmittance of complex systems and multi-dimensional. Identification of state equations. Tuning models. Fuzzy logic and identification of structures. Neural networks models.

Course content – project

LABORATOTY Parameter identification of dynamic models with stationary and non-stationary parameters. Modeling and parameter identification using artificial neural networks. Fuzzy modeling and control.

Prerequisites and co-requisites

Skills mathematical description of physical phenomena and complex technical processes. Knowledge of the subject Mathematics (0411200001, 0411200002), Numerical Methods (0411200009), optimization and decision making (0411200030) and the methods and basis of identification (0411210003)

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Practical exercise</td><td>60.0%</td><td>30.0%</td></tr>
<tr><td>Midterm colloquium</td><td>50.0%</td><td>70.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Stolc L.: Wstęp do metod optymalizacji i identyfikacji: ćwiczenia i laboratorium, Wyd. PG, Gdańsk 1985.

2. Piegat A.: Modelowanie i sterowanie rozmyte, Exit, Warszawa 1999

3. Gajek L., Kałuszka M.: Wnioskowanie statystyczne, WNT, Warszawa 1994

4. Mańczak K.: Metody identyfikacji wielowymiarowych obiektów sterowania, WNT, Warszawa 1971.</td></tr>
<tr><td>Supplementary literature</td><td>1. Lindgren B.: Elementy teorii decyzji, WNT, Warszawa 1977

2. Volk W.: Statystyka stosowana dla inżynieów, WNT, Warszawa 1973

3. Stoderstrom T., Stoica P.: Identyfikacja systemów, PWN 1997</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">• identification of dynamic object model parameters using the least squares method;
• designing of fuzzy reasoning system for control purposes;
• designing of the neural network model for control purposes on the basis on measured data.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.