(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: SYSTEMS AND CONTROL **2. Course code: SaC**

3. Validity of course description: 2019/2020

4. Level of studies: 2 nd cycle of higher education

5. Mode of studies: intramural studies

6. Field of study: Informatics

7. Profile of studies: general academic

8. Specialty: Industrial Informatics Systems

9. Semester: II

10. Faculty teaching the course: Institute of Informatics

11. Course instructor: PhD Stanisław Wideł

12. Course classification:

13. Course status: obligatory

14. Language of instruction: English

15. Pre-requisite qualifications: Linear Algebra, Mathematical Analysis,Physics

16. Course objectives:

The aim is to introduce students to the Linear Time-Invariant (LTI) System modeling methods and to study their dynamics, as well as control systems with a feedback loop. Based on differential equations, a Laplace transform is introduced. The concept of the transfer function is defined and the program code in Matlab is shown which is the model of the system.
The model allows answering basic questions in relation to the dynamics of the examined objects with emphasis on the feedback. The choice of settings for P, PI and PID controllers is studied and discussed.

17. Description of learning outcomes:

Nb.	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Knowledge on the transfer function applies to the mathematical representation of Linear Time-Invariant (LTI) systems	Final Test	Lecture	K2A_W01;
2.	Classification and identification of the I and II order systems	Final test	Lecture	K2A_W01;
3.	Understanding that the time domain response is a convolution.	Final test	Lecture	K2A_W01;
4.	Knowledge on: Open-loop and closed-loop control	Final test	Lecture	K2A_W01;
5.	Skills, how to choose, install and configure (parametrized) closed-loop P, PI, PID controler	Laboratory exercise	Laboratory, project	K2A_U10; K2A_U11;
6.	Skills, how to apply the control system model in the Matlab environment.	Laboratory exercise	Laboratory	K2A_U10; K2A_U11;
7.	Skills for to check system stability and control parameter settings	Laboratory exercise	Laboratory	K2A_U10; K2A_U11;

18. Teaching modes and hours

Lecture: 15 h

Laboratory: 15 h

19. Syllabus description:

Lectures:

1. Linear systems,
2. Laplace transform,
3. Transfer function,
4. Unit response, 1,2 order system, oscillation system,
5. Stability criterion,
6. Negative feedback controler,
7. P, PI, PID controler;

Labs:

1. Basics of design and coding of calculations using liniear Algebra,
2. Creating and operations on matrices,
3. Operators: relations and logical, logical indexing, logical functions,
4. Universalization and vectorization of subprograms,
5. Modeling of the dynamics of the first and second order systems,
6. Evaluation of control parameters P, PI, PID regulators;

20. Examination: none

21. Primary sources:

1. Ryszard Gessing, Control fundamentals, Silesian University of Technology, 2004
2. Ryszard Gessing, Teoria sterowania, Układy liniowe, wydanie 1302 z, Skrypty Uczelniane - Politechnika Śląska, ISSN 0434-0825

22. Secondary sources:

1. Stefan Węgrzyn, Podstawy Automatyki, 1990

23. Total workload required to achieve learning outcomes

no	Teaching mode :	Contact hours / Student workload hours
1	Lecture	15/15
2	Classes	/
3	Laboratory	15/15
4	Project	/
5	BA/ MA Seminar	/
6	Other	/
	Total number of hours	30/30

24. Total hours: 60

25. Number of ECTS credits: 2

26. Number of ECTS credits allocated for contact hours: 1

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1

28. Comments:

Approved:

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(date, Instructor's signature) (*date , the Director of the Faculty Unit signature)*