(faculty stamp)

COURSE DESCRIPTION

1. Course title: Applications of Control Systems	**2. Course code:**
3. Validity of course description: 2018/2019	
4. Level of studies: 2nd cycle of higher education (MSc)	
5. Mode of studies: intramural studies	
6. Field of study: Automatic Control and Robotics	
7. Profile of studies: general	
8. Programme: MEASUREMENT AND INFORMATION SYSTEMS	
9. Semester: 2	
10. Faculty teaching the course: Institute of Automatic Control	
11. Course instructor: dr hab. inż. Jerzy Kasprzyk, prof. Pol. Śl.	
12. Course classification: programme courses	
13. Course status: elective	
14. Language of instruction: English	
15. Pre-requisite qualifications: Controllers and industrial networks, measuring techniques, actuators, control theory. It is assumed that before starting the course, the student has preparation in the field of construction, operating principles, programming and operation of industrial controllers, he/she knows the basics of industrial metrology and digital control.	
16. Course objectives: The aim of the course is to familiarize students with examples of industrial applications of various complexity, realized with the use of modern technical solutions. They will also gain practical skills in this area.	
17. Description of learning outcomes:	

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1	Student has broadened knowledge about tasks, structures and operation principles of advanced control systems.	SP	WM	KW_14+
2	Student is familiar with the current state and the latest development trends of automation.	SP	WM	KW_20+
3	Student is able to develop documentation regarding the task implementation, and prepare a report including a discussion of the implementation of this task and obtained results.	CL, PS, OS	L	KU_03+
4	Student has the ability to self-education in order to improve	CL	L	KU_06+

	qualifications and professional competences.			
5	Student understands the need to learn throughout life.	CL	L	KK_01+

18. **Teaching modes and hours**
Lecture / BA /MA Seminar / Class / Project / Laboratory
30 / 0 / 0 / 0 / 0 / 30

19. Syllabus description:

Lectures:

Steps in the design of the control system, defining the control task, inputs, outputs, disturbances, limitations on signals, model of the object.
Defining the purpose of the control, selection of the control algorithm, designing the overall structure of the control system.
Designing a measuring system, selection of sensors, selection of actuators.
Controller selection and selection of the control algorithms.
Functional safety, requirements of the directive 2006/42/EC, standard IEC 61508 and Safety Integrity Level, standard EN ISO 13849-1 and Performane Level.
Start and stop the process, emergency stop, creating project documentation.
System start up and application testing.
Description of exemplary control system applications: electromagnetic mill, noise control in the active housing, vibration control in the semiactive suspension system.
Use of artificial intelligence methods to diagnose the control system.

Laboratory:

1. Control system in an electromagnetic mill – problem statement, developing a control system, selecting a measuring system and actuators.
2. Control system in an electromagnetic mill – implementation of the control algorithm, testing.
3. Noise control in the active housing - problem statement, developing a control system, selecting a measuring system and actuators.
4. Noise control in the active housing - implementation of the control algorithm, testing.
5. Vibration control in the semiactive suspension system - problem statement, developing a control system, selecting a measuring system and actuators.
6. Vibration control in the semiactive suspension system - implementation of the control algorithm, testing.

20. Examination: No

21. Primary sources: Levine W.: Control System Applications, CRC Press, 1999, ISBN 9780849300547

22. Secondary sources: Catalogs, manuals and instructions of various manufacturers.

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30/10
2	Classes	
3	Laboratory	
4	Project	15/30
5	BA/ MA Seminar	
6	Other	
	Total number of hours	

24. Total hours: 85
25. Number of ECTS credits: 3
26. Number of ECTS credits allocated for contact hours: 2
27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1
26. Comments:

Approved:

…….....
(date, Instructor's signature)

…….....
(date, the Director of the Faculty Unit signature)