(*faculty stamp*)

COURSE DESCRIPTION

1. Course title: AUTOMATICS AND DYNAMICS OF PROCESSES	**2. Course code**
3. Validity of course description: 2017/2018	
4. Level of studies: 2nd cycle of higher education	
5. Mode of studies: intramural studies	
6. Field of study: ENVIRONMENTAL ENGINEERING	(FACULTY SYMBOL) RIE
7. Profile of studies: academic	
8. Programme: Heating, Ventilation and Air Conditioning	
9. Semester: 3	
10. Faculty teaching the course: Department of Heating, Ventilation and Dust Removal Technology	
11. Course instructor: prof. dr hab. inż. Zbigniew Popiołek	
12. Course classification: specialty subjects	
13. Course status: compulsory	
14. Language of instruction: English	
15. Pre-requisite qualifications: -	
16. Course objectives: Gaining knowledge of the dynamics of the processes and the basics of automation**.**	

17. Description of learning outcomes:

Nr	Learning outcomes description	Method of assessment	Teaching methods	Learning outcomes reference code
1.	Knows the basic terms used in automation and classification of automatic control systems	written test	lecture	K_W12, K_W15, K_W22
2.	Knows the use of operational calculus for solving linear differential equations, static linearization, linearization of nonlinear differential equations, the concept and application of transfer function	written test	lecture	K_W12, K_W15, K_W22
3.	Knows the time and frequency characteristics - spectral transmittance properties of typical linear elements - an element of proportional, integral, differentiator, inertial, inertial second order, oscillating and time delay, knows the flowcharts and their transformation,	written test	lecture	K_W12, K_W15, K_W22
4.	Knows the transmittance of automatic control systems, automatic control objects - static and astatic, experimental methods for determining the characteristics of objects, types of regulators, the dynamic properties of the continuous controllers and their construction,	written test	lecture	K_W12, K_W15, K_W22
5.	Know how to use a single or double controller, continuous controller - Proportional Integral control, know how to select settings of the PID controller,	report	laboratory	K_U14, K_U26
6.	Can evaluate dynamic properties of the object - knows how to prepare time and frequency characteristics	report	laboratory	K_U14, K_U26
7.	Can create software for the automatic control of simple installation	report	laboratory	K_U14, K_U26

18. Teaching modes and hours

Lecture : 30h / Laboratory:30h

19. Syllabus description:

a lecture

Basic terms in automatic classification of automatic control systems, operational calculus, method of search for the original function, the use of operational

calculus for solving linear differential equations, static linearization, linearization of nonlinear differential equations, dimensionless input and output of the transfer function, the time respond characteristics, the frequency characteristics - spectral transmittance, properties of typical linear elements - the proportional element, integral, differential, inertial, second order inertial, oscillating and delay line, block diagrams and their transformation, transfer functions of automatic control systems, automatic control objects - static and astatic, experimental determination of the characteristics of the objects, types of controllers, continuous regulators - the dynamic properties and the construction, self-acting regulators, two and three state regulators, principles of regulators selection, the selection of the PID controller settings,

laboratory

Two and three state regulator, continuous controller – proportional-integral regulator, selecting setting for the PID controller, the measurement of dynamic properties - time and frequency characteristics of the elements of automation - actuators and sensors, creating software for the automatic control of simple installation.

20. Examination: no

21. Primary sources:

1. Holejko D. Kościelny W, J.: Automatyka procesów ciągłych, Oficyna Wyd. Politechniki Warszawskiej, 2012
2. Kabza Z., Kostyrko K., i in.: Regulacja mikroklimatu pomieszczenia Agencja Wydawnicza PAK-u, 2005
3. Zawada B.: Układy sterowania w systemach wentylacji i klimatyzacji, Oficyna Wyd. Pol. Warszawskiej, 2006
4. Raven F. H.: Automatic control engineering, Third edition, McGraw-Hill Book Company, 1978
5. Horan Thomas: Control Systems and Applications for HVAC/R, PRENTICE HALL, 1997

22. Secondary sources:

23. Total workload required to achieve learning outcomes

Lp.	Teaching mode :	Contact hours / Student workload hours
1	Lecture	30 / 0
2	Classes	/
3	Laboratory	35 / 25
4	Project	/
5	BA/ MA Seminar	/
6	Other	/
	Total number of hours	65 / 25

24. Total hours: 90

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): 2

26. Comments:

Approved:

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