

COURSE DESCRIPTION CARD

Faculty of Electrical Engineering										
Field of study	Electrical and Electronics Engineering							Degree level and programme type	bachelor's degree	
Specialization/ diploma path	-							Study profile	-	
Course name	Control Engineering and Systems							Course code	IS-FEE-10024S	
								Course type	elective	
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	summer	
	30				30			No. of ECTS credits	6	
Entry requirements	Fundamentals of Control Engineering									
Course objectives	This course extends the students' knowledge of state space approach to analyze and synthesis of control systems. Workshops will learn how to design and simulate considered systems in specialized software.									
Course content	Description of multivariable dynamical systems in state space and by the use of transfer matrix. Controllability and observability of linear systems, Kalman decomposition. Modal control, observer synthesis, use of observer to modal control. Linear matrix inequalities. Computer aided design and simulations of control systems.									
Teaching methods	lecture, specialized workshops									
Assessment method	written exam (lecture), evaluation of reports (workshops)									
Symbol of learning outcome	Learning outcomes							Reference to the learning outcomes for the field of study		
LO1	express a dynamical system in state-space form									
LO2	classify models of multivariable dynamical systems									
LO3	describe procedure of synthesis of modal control and state observer									
LO4	use an observer to estimate a state of dynamical system									
LO5	use specialized software to design and analyze of control systems									
LO6										
Symbol of learning outcome	Methods of assessing the learning outcomes							Type of tuition during which the outcome is assessed		

LO1	exam, evaluation of reports	L, SW	
LO2	tests on lecture content	L	
LO3	tests on lecture content	L	
LO4	exam, evaluation of reports	L, SW	
LO5	evaluation of reports	SW	
LO6			
Student workload (in hours)		No. of hours	
Calculation	lecture attendance	30	
	individual work on lecture topics	30	
	preparation for and participation in exam	45	
	participation in workshops	30	
	work on reports	30	
		TOTAL:	165
Quantitative indicators		HOURS	No. of ECTS credits
Student workload – activities that require direct teacher participation		60	2
Student workload – practical activities		105	4
Basic references	1. Norman N. S.: Control systems engineering 5th ed., John Wiley a. Sons, Hoboken 2008. 2. Friedland B.: Control System Design: An Introduction to State-Space Methods, Dover Publ. Inc. 2005. 3. Williams II R. L., Lawrence D. A.: Linear State-Space Control Systems, John Wiley a. Sons, New Jersey 2007. 4. Kaczorek T.: Linear Control Systems, vol. 1 and 2, Research Studies Press, 1993. 5. Doyle J.C., Francis B.A., Tannenbaum A.R.: Feedback Control Theory, Macmillan, 1992.		
Supplementary references	1. Kaczorek T.: Polynomial and Rational Matrices: Applications in Dynamical Systems Theory , Springer-Verlag, 2006. 2. Rogowski K.: Presentations for lecture (on-line available).		
Organisational unit conducting the course	Control Engineering and Electronics	Date of issuing the programme	
Author of the programme	Krzysztof Rogowski	31.03.2016	

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work,
S – seminar