

Specification for the book of courses

Study program		Control Systems		
Module		Automatic Control		
Type and level of studies		Master studies		
The name of the course		Hydraulic and Pneumatic Control Systems		
Lecturer (for lectures)		Nikolić D. Vlastimir		
Lecturer/associate (for exercises)		Todorović Z. Darko		
Lecturer/associate (for OFE)				
Number of ECTS	5	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	Gaining knowledge in basics of hydraulics and pneumatics. Analysis and design of hydraulic and pneumatic control systems.			
Course outcomes	Theoretical and practical knowledge in basics of hydraulics and pneumatics, modelling of hydraulic and pneumatic systems, as well as analysis of hydraulic and pneumatic control systems.			
Course outline				
Theoretical teaching	Hydraulic drive. Hydraulic actuators, pumps and motors. Hydraulic control elements. Elements of the data transfer. Electro-hydraulic servo valves and electrohydraulic servomechanisms. Control concepts for hydraulic control systems. Methods for the analysis of electrohydraulic control systems. Nonlinearities in the hydraulic control system. Analysis of specific cases. Features of the air. Providing pressure, transmission and control. Pneumatic valves, compressors, pneumatic cylinders and motors, pneumatic drive. Pneumatic control techniques. Fluid logic. Fluid amplifiers.			
Practical teaching (exercises, OFE, study and research)	Practical examples that follow and illustrate the lecture units.			
Textbooks/references				
1	H. Marrit, Hydraulic control systems, Prentice Hall International, 1989			
2	J. Watton, Fluid power systems – modeling, simulation, analog and microcomputer control, Prentice Hall International, Hertfordshire, 1989.			
3	R. B. Walters, Hydraulic and electro-hydraulic systems, Elsevier Applied Science, New York, 1991.			
4	Z. Ribar, Pneumoelectrical control systems (in Serbian), Faculty of Mechanical Engineering in Belgrade, 1997.			
5	R. Mirković, Hydraulics: Introduction with applications in control (in Serbian), second edition, Micro book, 2013.			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
2	2	0		
Teaching methods	Lectures, Auditory Exercises, Computer Exercises; Consultations			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam		Points
Activity during lectures	10	Written exam		
Exercises	10	Oral exam		30
Colloquia	30			
Projects	20			