

Specification for the book of courses

Study program		Electrical Engineering and Computer Science		
Module		Common		
Type and level of studies		Doctoral studies		
The name of the course		Advanced Mechatronics		
Lecturer (for lectures)		Perić Lj. Staniša		
Lecturer/associate (for exercises)				
Lecturer/associate (for OFE)				
Number of ECTS	10	Course status (obligatory/elective)	Elective	
Prerequisites				
Course objectives	Acquiring knowledge about basic theories and computer methodologies used in modelling and control of mechatronic systems.			
Course outcomes	Training students to independently design and control mechatronic systems.			
Course outline				
Theoretical teaching	Introduction: Mechatronic systems and review of linear systems. Minimal realizations of linear systems and Kalman decomposition. Function of matrices and phase portraits of linear systems. Phase portraits of nonlinear systems. Bifurcation theory. Lyapunov stability. Lie brackets and feedback linearization. Sliding mode control. Disturbance rejection. Systems with multiple inputs and multiple outputs. The principle of optimality. Linear Quadratic Regulation and Tracking. Introduction to digital control and z-domain. Digital control system design.			
Practical teaching (exercises, OFE, study and research)				
Textbooks/references				
1	Chi-Tsong Chen, "Linear system theory and design", Oxford University press, 1999.			
2	Hassan K. Khalil, "Nonlinear systems", Prentice Hall, 2002.			
3	Gene F. Franklin, J. David Powell, Abbas Emami-Naeini, "Feedback control of dynamic systems", Prentice-Hall, 2010.			
4	Clarence W. De Silva, "Mechatronics: An Integrated Approach", CRC Press, 2005.			
5	Sabri Cetinkunt, "Mechatronics", John Wiley & Sons Inc., 2007.			
Number of classes of active education per week during semester/trimester/year				
Lectures	Exercises	OFE	Study and research work	Other classes
3	0	0	0	0
Teaching methods	Lectures/consultations (according to the number of students); study and research work (insight into literature, problem analysis, finding solutions, writing and presentations of independent work).			
Grade (maximum number of points 100)				
Pre-exam duties	Points	Final exam		Points
Activity during lectures		Written exam		
Exercises		Oral exam		50
Colloquia				
Projects	50			