

## Specification for the book of courses

<b>Study program</b>		Control Systems		
<b>Module</b>		Automatic Control		
<b>Type and level of studies</b>		Master studies		
<b>The name of the course</b>		Methods of digital control and estimation		
<b>Lecturer (for lectures)</b>		Veselić R. Boban		
<b>Lecturer/associate (for exercises)</b>		Mitić M. Vladimir		
<b>Lecturer/associate (for OFE)</b>				
<b>Number of ECTS</b>	5	<b>Course status (obligatory/elective)</b>	Elective	
<b>Prerequisites</b>				
<b>Course objectives</b>	Introduce to students some modern approaches to digital control and control plant state estimation.			
<b>Course outcomes</b>	Provide the students with theoretical and practical knowledge needed for the application of modern digital control techniques. Train the students to use computer support in design and simulation of digital control systems.			
<b>Course outline</b>				
<b>Theoretical teaching</b>	Review of the mathematical background and digital systems analysis in z-domain. Linear digital systems frequency response. Bilinear transformation. Bode plots. Digital compensators design in z- and frequency domain. State space approach. Controllability and observability. Canonical state space forms. State feedback control and pole placement method. Ackerman formula. Deadbeat response. State variables estimation. Linear digital state observers and their design. Elements of the theory of stochastic processes. State estimation in uncertain control systems. Kalman filter.			
<b>Practical teaching (exercises, OFE, study and research)</b>	Elaboration of methodical units of the lectures through examples with intensive use of MATLAB Control Toolbox as a substantial support in design, simulation and validation of digital control systems.			
<b>Textbooks/references</b>				
1	Katsuhito Ogata, Discrete-Time Control Systems, Second Edition, Prentice-Hall International, 1995.			
2	Gene F. Franklin, J. David Powell, Michael L. Workman, Digital Control of Dynamic Systems, Third Edition, Addison-Wesley, 1997.			
3	Charles L. Phillips, H. Troy Nagle, Digital Control System Analysis and Design, Third Edition, Prentice Hall, 1994.			
4				
5				
<b>Number of classes of active education per week during semester/trimester/year</b>				
<b>Lectures</b>	<b>Exercises</b>	<b>OFE</b>	<b>Study and research work</b>	<b>Other classes</b>
2	2	0		
<b>Teaching methods</b>	Lectures; Auditory and computer exercises; Consultations.			
<b>Grade (maximum number of points 100)</b>				
<b>Pre-exam duties</b>	<b>Points</b>	<b>Final exam</b>	<b>Points</b>	
<b>Activity during lectures</b>	10	<b>Written exam</b>	20	
<b>Exercises</b>	10	<b>Oral exam</b>	20	
<b>Colloquia</b>	20			
<b>Projects</b>	20			