

## Specification for the book of courses

<b>Study program</b>		Electrical Engineering and Computer Science		
<b>Module</b>		Control Systems		
<b>Type and level of studies</b>		Undergraduate Academic Studies		
<b>The name of the course</b>		Programmable Logic Controllers		
<b>Lecturer (for lectures)</b>		Jovanović D. Zoran, Nikolić S. Saša		
<b>Lecturer/associate (for exercises)</b>		Spasić D. Miodrag, Nikolić S. Saša		
<b>Lecturer/associate (for OFE)</b>		Spasić D. Miodrag		
<b>Number of ECTS</b>	5	<b>Course status (obligatory/elective)</b>	Obligatory	
<b>Prerequisites</b>				
<b>Course objectives</b>	Adopting basic knowledge about structure, mode, programming and practical application of PLC in industry.			
<b>Course outcomes</b>	Theoretical and practical knowledge of PLC systems. Design of control systems based on PLC. Creating application software for PLC in the appropriate development environment.			
<b>Course outline</b>				
<b>Theoretical teaching</b>	Introduction to Programmable Logic Controllers (PLC). Input output devices. Processing of input-output signals. Programming programmable logic controllers. Scan cycle-execute program. Ladder diagrams, list of commands, function blocks. Logical functions. Examples. PLC Components. Internal relays. Timers. Counters. Shift registers. Data processing. Development phase of programs for PLC. Testing and troubleshooting. Application of current PLC systems of various manufacturers (Siemens, Omron, Mitsubishi, Allen Bradley, Schneider Electric). Example of PLC application in the management of distributed management systems.			
<b>Practical teaching (exercises, OFE, study and research work)</b>	Practical introduction of the PLC structure. PLC programming modes; Getting to know the operating mode and application of PLC-Siemens and development software Totally Integrated Automation Portal V13 (TIA Portal V13). Working with PLC-Omron and development software CX One. Application of PLC in Distributed Management Systems. Application of PLC in dosing systems, transport systems, water supply systems. Application of PLC in the management of thermal processes. Independent work in the development environment of the appropriate PLC and application software development, with verification on lab models.			
<b>Textbooks/references</b>				
1	D. Collins, E. Lane, "Programmable Controllers: A Practical Guide", McGraw-Hill, 1995.			
2	W. Bolton, "Programmable Logic Controllers", Newnes, 2003.			
3	F. D. Petruzella, Programmable Logic Controllers (in Serbian), Mikro book, 2011.			
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	1	1	0	0
<b>Teaching methods</b>	Lectures; Laboratory Exercises; 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>		30
<b>Exercises</b>	30	<b>Oral exam</b>		30
<b>Colloquia</b>				
<b>Projects</b>				