

## Specification for the book of courses

<b>Study program</b>		Electrical Engineering and Computer Science		
<b>Module</b>		Common		
<b>Type and level of studies</b>		Doctoral studies		
<b>The name of the course</b>		Advanced Error Control Coding Techniques		
<b>Lecturer (for lectures)</b>		Jovanović Ž. Aleksandra		
<b>Lecturer/associate (for exercises)</b>				
<b>Lecturer/associate (for OFE)</b>				
<b>Number of ECTS</b>	10	<b>Course status (obligatory/elective)</b>	Elective	
<b>Prerequisites</b>				
<b>Course objectives</b>				
Disseminating knowledge and getting acquainted with the latest achievements and research in the field of the error control coding, with a special emphasis on the advanced iterative decoding algorithms.				
<b>Course outcomes</b>				
The student will fully understand the complex iterative decoding algorithms and will be able to implement them. The student will acquire knowledge that will enable him to follow professional literature and to engage in scientific research in the field of error control coding.				
<b>Course outline</b>				
<b>Theoretical teaching</b>				
Error correction codes in modern communication systems and storage systems. Trellis-based decoders. Viterbi algorithm. SOVA algorithm. BCJR algorithm. Iterative decoding of codes on graphs (LDPC codes). Bit-flipping algorithm. Message passing algorithm and turbo principle. Sum-product algorithm. Min-sum algorithm. Gallager A and B algorithms.				
<b>Practical teaching (exercises, OFE, study and research)</b>				
Project assignments.				
<b>Textbooks/references</b>				
1	W. E. Ryan, S. Lin, Channel Codes - Classical and Modern, Cambridge University Press, 2009.			
2	Silvio A. Abrantes, From BCJR to turbo decoding: MAP algorithms made easier, <a href="https://paginas.fe.up.pt/~sam/textos/From%20BCJR%20to%20turbo.pdf">https://paginas.fe.up.pt/~sam/textos/From%20BCJR%20to%20turbo.pdf</a>			
3	R. G. Gallager, Low Density Parity Check Codes, <a href="https://web.stanford.edu/class/ee388/papers/ldpc.pdf">https://web.stanford.edu/class/ee388/papers/ldpc.pdf</a>			
4	T. Richardson, R. Urbanke, Modern Coding Theory, Cambridge University Press, Cambridge, 2008.			
5	S. Lin, D. J. Costello, Error Control Coding, Pearson, 2004.			
<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>
3	0	0	0	0
<b>Teaching methods</b>				
Lectures. Consultations. Scientific research.				
<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>	
<b>Exercises</b>			<b>Oral exam</b>	40
<b>Colloquia</b>				
<b>Projects</b>		50		