

## 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>		Coherent Optical Telecommunication Systems		
<b>Lecturer (for lectures)</b>		Milić N. Dejan		
<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>				
Students will be introduced to details about coherent systems in modern optical telecommunications and to the critical review of the methods used in analysis of such systems.				
<b>Course outcomes</b>				
Acquired knowledge enables understanding of the modern trends in optical communications, provides a background for estimating a practical usability of such trends, and introduces the students to academic research in the field of optical communications.				
<b>Course outline</b>				
<b>Theoretical teaching</b>				
Coherent detection in optical communications. Differences between IM/DD and coherent systems. Modulation formats. Generation of RZ-DPSK signals. Homodyne and heterodyne detection. Balanced detection. Quadrature receivers. Synchronous and asynchronous demodulation. Interferometric detection. Phase noise. Phase and polarization diversity. Polarization modulation. Multiplexing of optical signals. TDM, FDM, WDM, SCM, CDMA. Polarization multiplexing. Cross-phase modulation. Spectral efficiency of IM/DD and coherent channels. Quantum capacity limits.				
<b>Practical teaching (exercises, OFE, study and research)</b>				
<b>Textbooks/references</b>				
1	G. Agrawal, Lightwave Technology: Telecommunication Systems, John Wiley & Sons, 2005			
2	G. Jacobsen, Noise in Digital Optical Transmission Systems, The Artech House Library, London, 1994			
3	G. Agrawal, Fiber Optic Communications Systems, John Wiley & Sons, 2002			
4	K. Iizuka, Elements of Photonics, Volume II, John Wiley & Sons 2002			
5	A. Papoulis, Probability, Random Variables and Stochastic Processes, McGraw Hill, 1991			
<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>				
Theory classes, consultations, study and research work.				
<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>			<b>Written exam</b>	
<b>Exercises</b>			<b>Oral exam</b>	50
<b>Colloquia</b>				
<b>Projects</b>		50		