Specification for the book of courses

Study program		Communications and Information Technologies		
Module		System Engineering and Radio-Communications		
Type and level of studies		Master studies		
The name of the course		Broadband Access Networks		
Lecturer (for lectures)		Dončov S. Nebojša, Stanković Ž. Zoran		
Lecturer/associate (for exercises)		Dimitrijević Ž. Tijana		
Lecturer/associate (for OFE)		Dimitrijević Ž. Tijana		
Number of ECTS	4	**Course status (obligatory/elective)**	Elective	
Prerequisites				
Course objectives	Acquisition of basic knowledge of access technologies for distribution of broadband interactive services. Getting familiar with possible types and architectures of broadband access networks and standards and recommendations.			
Course outcomes	Knowledge of the main characteristics of broadband access technologies. Ability to choose the optimal architecture of access network for an efficient distribution of broadband interactive services.			
Course outline				
Theoretical teaching	General model of access network. Review of characteristics of transmission media. Standards and recommendations. Broadband access technology over telecommunication cables with symmetric pairs. Symmetric and asymmetric xDSL access technologies (HDSL, SHDSL, ADSL2+, VDSL). Devices for broadband access (splitters, IP-DSLAM, xDSL modems). Fiber in the loop (FITL). Topologies of optical access networks. Passive and active optical networks in the local loop (BPON, GPON, EPON, AON). DWDM systems. Combined technologies in access networks. Modernization of cable distribution system by using hybrid networks with optical and coaxial cables (HFC network). Bi-directional signal transmission and services (cable TV, internet, video on demand, voice transmission). Cable modem terminal system (CMTS). Cable modems. Broadband access over power lines. PLC access network via low-voltage power lines (basic elements: PLC base station modem, repeater, gateway). In-home PLC networks. Wireless local loop. Fixed and mobile wireless access. Broadband wireless access technologies. Multiservice access nodes (MSAN).			
Practical teaching (exercises, OFE, study and research	Practical work with measuring instruments for the characterization of access networks at the physical level and IP level.			
Textbooks/references				
1	Leonid G. Kazovsky et al., Broadband Optical Access Networks, John Wiley and Sons Inc., 2011.			
2	Philip Golden et al., Fundamentals of DSL technology, Auerbach Publications, Taylor & Francis Group, 2006.			
3	Martin Clark, Wireless Access Networks: Fixed Wireless Access and WLL Networks – Design and Operations, John Wiley and Sons Ltd, 2000.			
4	Halid Hrasnica et al., Broadband Powerline Communications - Network Design, John Wiley and Sons Ltd, 2004.			
5	Nebojša S. Dončov, Broadband access networks (in Serbian), script, Niš, 2010.			

Number of classes of active education per week during semester/trimester/year				
Lectures	**Exercises**	**OFE**	**Study and research work**	**Other classes**
2	1	1	0	0
Teaching methods	Lectures, practical work, consultations, seminar paper.			

Grade (maximum number of points 100)			
Pre-exam duties	**Points**	**Final exam**	**Points**
Activity during lectures	5	**Written exam**	
Exercises	30	**Oral exam**	30
Colloquia			
Projects	35		