Course Unit Descriptor

Study Programme: Power, Electronic and Telecommunication Engineering (Telecommunication Systems)		
Course Unit Title: Information and Communication Theory		
Course Unit Code: EK521		
Name of Lecturer(s): Dejan Vukobratović		
Type and Level of Studies: Master Academic Degree		
Course Status (compulsory/elective): compulsory		
Semester (winter/summer): winter		
Language of instruction:english		
Mode of course unit delivery (face-to-face/distance learning): face-to-face		
Number of ECTS Allocated:6		
Prerequisites: Mathematical Algebra, Mathematical Analysis, Theory of Probability, Digital Communications, Theory of Linear Discrete Systems, Introduction to Information Theory (statistical channel modeling, optimum channel decoding, calculation of decoding error probability and channel capacity), Introduction to Coding Theory (basics of block and convolutional codes).		
Course Aims: Becoming familiar with the theoremes of the information theory and reachable limits of communication.		
Learning Outcomes: Students acquire the information theory elements and are able to apply them in the design of communication systems and devices.		
Syllabus: Theory of Information and Communication is an advanced course and in order to be able to attend it the student should have passed the exams in the following basic courses (or their equivalents): Mathematical Algebra, Mathematical Analysis, Theory of Probability, Digital Communications, Theory of Linear Discrete Systems, Introduction to Information Theory (statistical channel modelling, optimum channel decoding, calculation of decoding error probability and channel capacity), Introduction to Coding Theory (basics of block and convolutional codes). Source coding (statistical coding), AER lemma, Kraft-McMillan lemma, Shannon's first theorem, damaged data source compression; Protection coding (information channel capacity and calculation methods, cascaded channels, optimal docoding). Performance criteria, channel code capacity, features of a binary symetrical channel, Shannon's second theorem, typical sequence access; Cryptographic coding (the unique point, basic cryptographic algorithms), geometrical approach to the design and analysis of transmitters and receivers (vector channels, multivector channels, decision making, wave channels, GramSchmidt's process, signal synthesis, geometrical interpretation, corelational receiver, adaptive filter, irrelevant data in adaptive filtering, error probability, error bounds on the error probablitiy, the transmission speed, signal energy per bit of information, the impact of bandwidth. The limiting relationship between signal and noise (-1.6 dB); multi-user information theory.		
Required Reading: Relevant literature in English TBD		
Weekly Contact Hours:	**Lectures:**	**Practical work:**
Teaching Methods: Lectures. Practice. Powerpoint.		
Knowledge Assessment (maximum of 100 points):100		

Pre-exam obligations	points	**Final exam**	points
Test	10	Oral part of the exam	70
Test	10		
Test	10		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			