

Study program: Communication technologies			
Course title: Multimedia Signals and Systems			
Professor/assistant: Zoran Milivojević, Ph. D.			
Type of course: compulsory			
ECTS credits: 6			
Pre-requisites: none			
Aims of the course: This course deals with the study of multimedia audio, speech and image signals. Also, it studies the systems for transmission, protection and archiving of multimedia signals. This course covers the study of a system for recording and reproduction of multimedia signals.			
Learning outcomes: The student will be trained to independently service and maintain the system for recording, transmission and reproduction of multimedia signals. In addition, the student will be capable of using application programs for recording, editing and improving audio and video signals.			
Syllabus			
<i>Theoretical part</i> Media classification. Introduction to audio signals. Introduction to video signals. Introduction to multimedia signals. A/D conversion of audio signals. 2D A/D conversion. MOS test. Text compression. Hoffman coding. Arithmetical coding. Multimedia communication standards. MPEG. H264. JPEG. Speech coding standards. Protection of multimedia signals. Digital watermark. Inserting digital watermark. Extracting watermark. Multimedia application. Multimedia production. Images in multimedia. Image sensors. Image processing. Bitmap image. Motion pictures in multimedia. Text in multimedia. Fonts. Animations. Computer animations. Animations in multimedia systems. 3D systems. Sound in multimedia. Touch in multimedia. Interaction in multimedia. Multimedia application software. Software tool for multimedia. Software tool for image processing. Software tool for animation. Recording, processing and editing audio signals.			
<i>Practical part</i> Lectures, computational exercises and exercises in laboratory on examples in practice. Consultations.			
Literature			
1. Bojković, Z., Martinović, D., <i>Osnove multimedijalnih tehnologija</i> , Visoka škola elektrotehnike i računarstva, Beograd, 2011. 2. Станковић, С., Оровић, И., Сејдић, Е., <i>Multimedia Signals and Systems</i> , University of Pittsburgh, Swanson School of Engineering, Department of Electrical and Computer Engineering.			
Number of active classes 60			Other forms of teaching:
Lectures: 30	Practical classes: 30	Research work:	
Teaching methods Combination of interactive approach with practical problems solving.			
Grading system (maximum 100 points), grading scale from 5 to 10: below 51 points grade 5, grade 6 from 51-60 points, grade 7 from 61-70 points, grade 8 from 71-80 points, grade 9 from 81-90 points, grade 10 from 91-100 points.			
Pre-exam obligations	points	Final exam	points
activity during theoretical lectures	20	written exam	30
practical training	10	oral exam	
colloquium(s)/seminar papers	20+20		
Sum	70	Sum	30