

		<b>Course title:</b> <i>Multimedia systems</i>		
<b>Course code</b>	<b>Course status</b>	<b>Semester</b>	<b>Number of ECTS credits</b>	<b>Lecture hours</b>
<i>PA1104</i>	<i>Mandatory</i>	<i>I</i>	<i>6</i>	<i>3+1</i>

<b>Study program:</b> Graduate academic studies, ELECTRICAL ENGINEERING, study program: Electronics, Telecommunications and Computer engineering (studies last for 4 semesters, 120 ECTS credits).	
<b>Prerequisites:</b> Digital Signal Processing	
<b>Course aims:</b> Students will be introduced in algorithms for compression, analysis and protection of digital audio, image and video. Also, they will be introduced in digital data transmission via computer networks.	
<b>Teacher(s) and assistant(s) first and last names:</b> Ph.D. Srdjan Stanković, Irena Orović	
<b>Studying method:</b> Lectures, exercises, individual work on practical tasks, consultations.	
<b>Course synopsis:</b>	
Preliminary week I week II week III week IV week V week VI week VII week VIII week IX week X week XI week XII week XIII week XIV week XV week XVI week Final week XVIII-XXI week	Preparation and semester enrolment. Introduction. Sampling, quantization, coding, Fourier transform and Discrete cosine transform. Filtering. Digital audio. Linear and non-linear A/D conversion. Speech signals. Psychoacoustical effects. Digital audio compression. MPEG-1, MPEG-2, MPEG-3 (MP3). ATRAC compression Storage of digital audio signals. CD, Mini disc, Super audio CD, DVD audio. Digital audio transmission. Optical cable. Digital audio broadcasting. <b>First test</b> Digital image. Basic concepts. Basic geometrical transformation of digital image. Color models. RGB, CMY, CMYK, YUV, YCrCb. Image filtering. Edge detection. JPEG compression Protection of digital data-Digital watermarking. <b>Second test</b> Digital video. Basic concepts. Formats of digital video 4CIF, CIF, QCIF, SubQCIF. Flow rate. Digital video compression. MPEG-1, MPEG-2, MPEG-4, MPEG-7, MPEG-21. Motion estimation. Algorithms for motion estimation Protocols and standards for data transmission: H261, H263, H26L H323, H324, H320. QoS. Architectures <b>Final exam</b> Administrative procedures. Additional lessons, correction of the final exam and administrative procedures.
<b>STUDENT WORKLOAD</b>	
<b>Working hours:</b> $6 \text{ credits} \times 40/30 = 8 \text{ hours}$ . <b>Working hours structure:</b> 3 hours for teaching 1 hour for exercises 4 hours for individual work, including consultations.	<b>Teaching and the final exam:</b> $(8\text{hours}) \times 16 = 128\text{hours}$ . <b>Necessary preparation</b> (before semester): $2 \times (8\text{hours}) = 16\text{hours}$ . <b>Total work hours for the course:</b> 180hours <b>Additional hours</b> for preparing correction of the final exam, including the exam taking: up to 33hours. <b>Working hours structure:</b> 128hours (lectures) + 16hours (preparation) + 33hours (additional work)
Lessons attendance is mandatory for students, as well as doing home and laboratory exercises and both tests.	
<b>Literature:</b> S. Stanković: <i>Multimedia systems, lecture notes, ETF Podgorica 2005.</i>	
<b>The forms of knowledge testing and grading:</b> - Each test carries 20 points (40 points total). - Seminar work 10 points - Final exam carries 40 points. Student gets the passing grade by collecting 51 points at least.	
<b>Special remarks for the course :</b> If needed, the course can also be taught in English.	
Teacher(s) who provided the information: <i>Ph.D. Srdjan Stanković</i>	