

<b>Course title:</b>	<b>Multimedia systems</b>
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Course code	Course status	Semester	Number of ECTS credits	Lecture hours
132004187	Mandatory	IV	6	3+0+2

**Study program:**

Basic applied studies, ELECTRICAL ENGINEERING, study program: Computer engineering (studies last for 6 semesters, 180 ECTS credits).

**Prerequisites:**

Passed final exams in courses **Mathematics in computer engineering** and **Mathematical packages**.

**Course aims:**

To introduce students to compression algorithms, analysis and protection of digital audio-data, digital image and video, as well as its transfer through computer networks.

**Teacher(s) and assistant(s):**

Ph.D. Srđan Stanković - teacher  
 Ph.D. Milovan Radulović - assistant  
 Dipl. ing. Radosav Puzović - assistant

**Teaching method:**

Lectures, exercises, consultations, tests.

**Course synopsis:**

Preliminary weeks	Preparation and semester enrolment.
I week	Introduction. Sampling, quantization, coding, Fourier and discrete cosine transform. Filtering. Digital audio. Linear and nonlinear A/D conversion. Speech signal. Psychoacoustical effects. Digital audio signal compression. MPEG-1, MPEG-2, MPEG-3 (MP3), ATRAC compression. Digital audio signal storage. CD, Mini disc, Super audio CD, DVD audio. Digital audio signal transfer. Optical fibres. Digital audio broadcasting. <b>First test</b> <b>Free week</b> Digital image. Basics. Basic geometric transforms on digital image. Colour models. RGB, CMY, CMYK, YUV, YCrCb. Image filtering. Edge detection. JPEG image compression. Digital data protection - Digital watermarking. <b>Second test</b> Digital video. Video signal - basics. 4CIF, CIF, QCIF, SubQCIF. Bandwidth. Digital video signal compression. MPEG-1, MPEG-2, MPEG-4, MPEG-7, MPEG-21. Motion estimation. Motion estimation algorithms. Data transfer protocols and standards: H261, H263, H26L H323, H324, H320. QoS. Architectures.  <b>Final exam</b>
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	Administrative procedures.
XVIII-XXI week	Additional lessons, correction of the final exam and administrative procedures.

**STUDENT WORKLOAD**

<u>per week</u>	<u>per semester</u>
<b>Working hours: 6 credits x 40/30 = 8 hours.</b> <b>Working hours structure:</b> 3 hours for teaching 2 hours for exercises 3 hours for individual work, including consultations.	<b>Teaching and the final exam: (8 hours) x 16 = 128 hours.</b> <b>Necessary preparation (before semester): 2 x (8 hours) = 16 hours.</b> <b>Total work hours for the course: 6 x 30 hours = 180 hours</b> <b>Additional hours for preparing correction of the final exam, including the exam taking: up to 36 hours.</b> <b>Work hours structure:</b> 128 hours (lectures) + 16 hours (preparation) + 36 hours (additional work)

Lessons attendance is mandatory for students, as well as doing exercises, home exercises and both tests.

**Literature:** S. Stanković: Multimedijalni sistemi, ETF Podgorica 2005 - handouts.

**The forms of knowledge testing and grading:**

- Each test carries 25 points (50 points total).
- Final exam carries 50 points.

Student gets the passing grade by collecting 51 points at least.

**Special remarks for the course:** Lessons are held in the amphitheatre (or computer classroom, if needed), while exercises are held in the computer classroom.

**Teacher(s) who provided the information: Ph.D. Srđan Stanković**

**Remark:**