

## SYLLABUS

### 1. Data about the program of study

1.1	Institution	The Technical University of Cluj-Napoca
1.2	Faculty	Electronics, Telecommunications and Information Technology
1.3	Department	Communications
1.4	Field of study	Electronics and Telecommunications Engineering
1.5	Cycle of study	Bachelor of Science
1.6	Program of study/Qualification	Telecommunications Technologies and Systems
1.7	Form of education	Full time
1.8	Subject code	TST-E50.10

### 2. Data about the subject

2.1	Subject name	Digital audio-video techniques									
2.2	Subject area	Electronics and Telecommunications Engineering									
2.3	Course responsible/lecturer	Professor Radu ARSINTE, PhD									
2.4	Teachers in charge of applications	Professor Radu ARSINTE, PhD									
2.5	Year of study	IV	2.6	Semester	2	2.7	Assessment	Verifica tion	2.8	Subject category	DID/DOB

### 3. Estimated total time

Year/ Sem.	Subject name	No. of weeks	Course			Applications			Indiv. study	TOTAL	Credits		
			[hours/ week]			[hours/ semester]							
			S	L	P	S	L	P					
IV/1		14	2		1	1	28		14	14	48	104	4

3.1	Number of hours per week	4	3.2	of which, course	2	3.3	applications	2
3.4	Total hours in the curriculum	56	3.5	of which, course	28	3.6	applications	28
Individual study								Hours
Manual, lecture material and notes, bibliography								21
Supplementary study in the library, online and in the field								5
Preparation for seminars/laboratory works, homework, reports, portfolios, essays								16
Tutoring								2
Exams and tests								4
Other activities								-
3.7	Total hours of individual study	48						
3.8	Total hours per semester	104						
3.9	Number of credit points	4						

#### 4. Pre-requisites (where appropriate)

4.1	Curriculum	Basic courses in electrical and electronic engineering from TTS or AE curricula
4.2	Competence	Use of electronic test and measurement instruments and computing technique

#### 5. Requirements (where appropriate)

5.1	For the course	Cluj-Napoca
5.2	For the applications	Cluj-Napoca

#### 6. Specific competences

Professional competences	<p>C4. To design, implement and operate data, voice, video and multimedia services, based on the understanding and application of fundamental concepts from the field of communications and information transmission.</p> <p>C5. To select, install, configure and exploit fixed and mobile telecommunications equipment. To equip a site with common telecommunications networks.</p> <p>C6. To solve wide-band telecommunications networks' specific problems: propagation in various transmission media, high frequency circuits and equipment (microwaves and optical).</p>
Cross competences	N.A.

#### 7. Discipline objectives (as results from the key competences gained)

7.1	General objectives	Explanation and interpretation of methods for signal acquisition and processing (audio and video). Explanation and interpretation of the main requirements and techniques to handle data transmission for voice, video, multimedia in physical environments.
7.2	Specific objectives	Solve of practical problems using general knowledge of multimedia techniques. Interconnect audio-video equipment with other equipment for processing and storage. Evaluate functionally and qualitatively an audio / video system using presentation or service manual. To interconnect and integrate the equipment for processing and recording of information in systems with complex functionality, including computer controlled systems.

## 8. Contents

8.1. Lecture (syllabus)		Teaching methods	Notes
1	Informational aspects of audio signals. Human hearing characteristics. Electrical - acoustical characteristics.	Presentation, heuristic conversation, exemplification, problem presentation, teaching exercise, case study, formative evaluation	Use of .ppt presentation, projector, blackboard
2	Audio signal digitization. Digital processing of audio signal. Analog to digital conversion of audio signal. Music and voice signal formatting.		
3	Magnetic recording. Analog magnetic recording. Digital magnetic recording. DAT system.		
4	Optical recording. Audio optical recording; principles, optical aperture.		
5	CD System. Informational aspects. Functional versions: Audio CD, VCD, CDROM		
6	Main parameters of digital audio systems. Frequency response, distortions, cross-talk		
7	Special audio effects in digital technology. Echo, noise suppression Digital interfaces in audio technology. PC based implementations.		
8	Informational characteristics of visual information. Technical vision systems.		
9	Digital video signal processing. Digitization. Analog/digital conversion.		
10	Digital methods and techniques for video processing in storage equipment		
11	Primary video sources. Analog and digital video recorders. Rotary head principle.		
12	Compression techniques adaptation for audio-video optical and magnetic storage. Video compression principles. Commercial video formats: MPEG 2, MPEG4, AVC. Broadcasting (DVB).		
13	Audio-video optical storage: DVD, HD-DVD, BluRay. High density recording principle. Logical and informational organization of storage supports.		
14	Integrated audio-video processing systems based on high performance computers. Nonlinear audio-video editing. Workstations and software for nonlinear editing.		
8.2. Applications (lab)		Teaching methods	Notes
1	Audacity audio processing environment. Audio acquisition and conversion using Audacity.	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers, magnetic board
2	Noise reduction systems study using simulation on Audacity		
3	Audio system performance evaluation using PC		
4	Video acquisition programs: Virtual Dub. Video filtering using Virtual Dub		
5	Codes used in optical and magnetic information storage		
6	Video acquisition in computer environment. Audio-video device management under Windows and Linux.		
7	Laboratory test		
	Projects		
1	Overview of projects. Planning.		
2	Acquisition and pre-processing audio information using Audacity		
3	Purchase information from sources SVC video (composite video signal)		
4	Information acquisition from sources of streaming video		
5	Creating audio and video content for CD / DVD using VirtualDub and /or Ulead Video Studio		
6	Assessment of different options for video media and burning		
7	Project presentation and evaluation		
<b>Bibliography</b> References (Textbooks, courses, laboratory manual, exercise book) In UTC-N library (print) 1. Radu Arsinte – Tehnici Digitale audio-video – curs introductiv, Ed. Napoca Star, 2015			

2. Radu Arsinte – Prelucrari digitale audio-video, Ed. Risoprint, 2006  
 Electronic media  
 1. Radu Arsinte – CD course support -2013 (translated from Didatec)  
 2. Radu Arsinte – <http://bavaria.utcluj.ro/~arsinte/TDAV>  
 Additional:  
 1. Udo Zolzer, Digital Audio Signal Processing, Second Edition, John Wiley and Sons, 2008  
 2. Cliff Wooton, A Practical Guide to Video and Audio Compression, Focal Press, 2005  
 2. J. Whitaker, B. Benson – Standard Handbook of Video and Television Engineering, Mc.Graw-Hill, 2003  
 3. F. Alton Everest - The Master Handbook of Acoustics , MC.Graw-Hill, 2001  
 On-line references  
 1. Radu Arsinte – Media Processors - <http://users.utcluj.ro/~arsinte/ProcMedia>

9. Bridging course contents with the expectations of the representatives of the community, professional associations and employers in the field

Competences acquired will be used in the following COR occupations (Electronics Engineer; Telecommunications Engineer; Electronics Design Engineer; System and Computer Design Engineer; Communications Design Engineer) or in the new occupations proposed to be included in COR (Sale Support Engineer; Multimedia Applications Developer; Network Engineer; Communications Systems Test Engineer; Project Manager; Traffic Engineer; Communications Systems Consultant).

### 10. Evaluations

Activity type	10.1	Assessment criteria	10.2	Assessment methods	10.3	Weight in the final grade
Course		The level of acquired theoretical knowledge and practical skills		- Summative evaluation written exam (theory and problems)		- T, max 10 pts. 50%
Applications		The level of acquired abilities		- Final laboratory test - Project presentations		- L, max. 10 pts. 25% - P, max.10 pts. 25%

10.4 Minimum standard of performance

$$E \geq 4.5 \quad \text{and} \quad 0.5E + 0.25L + 0.25P \geq 4.5$$

Date of filling in  
01.10.2014

Course responsible  
Professor  
Radu ARSINTE, PhD

Teachers in charge of applications  
Assistant Professor  
Simina EMERICH, PhD

Date of approval  
in the department  
01.10.2014

Head of Communications  
Department  
Professor Virgil DOBROTA, PhD