SYLLABUS

1. Data about the program of study

1.1 Institution	Technical University of Cluj-Napoca
1.2 Faculty	Faculty of Electronics, Telecommunications and information Technology
1.3 Department	Communications
1.4 Field of study	Electronic Engineering, Telecommunications and Information Technologies
1.5 Cycle of study	Bachelor of Science
1.6 Program of study / Qualification	Telecommunications Technologies and Systems/ Engineer
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	Theoretical area Methodological area Analytic area						
2.3 Course responsible	Assist. Prof. Camelia FLOREA – Camelia.Florea@com.utcluj.ro						
2.4 Teacher in charge with laboratory / project	Assist. Prof. Camelia FLOREA – Camelia.Florea@com.utcluj.ro						
2.5 Year of study	IV	2.6 Semester	7	2.7 Assessment	V	2.8 Subject category	DS/DO

3. Estimated total time

3.1 Number of hours per week	4	of which: 3.2 course	2	3.3 seminar / laboratory	2
3.4 To Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar / laboratory	28

Distribution of time	Hours
Manual, lecture material and notes, bibliography	21
Supplementary study in the library, online specialized platforms and in the field	5
Preparation for seminars / laboratories, homework, reports, portfolios and essays	12
Tutoring	2
Exams and tests	4
Other activities:	

3.7 Total hours of individual study	44
3.8 Total hours per semester	100
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	
5.2. for the seminars / laboratories / projects	

6. Specific competences

Professional competences	**C4. Design, implementation and operation of data, voice, video and multimedia services. This is based on the understanding and the application of fundamental concepts in telecommunications and transmission of information** **C5. Selecting, installing, configuring and operating fixed or mobile telecommunications equipment. Equipping a site with usual telecommunications networks** **C6. Solving specific problems of the broadband communications networks: propagation in different environment, circuits and equipment for high frequencies (microwaves and optical).**
Transversal competences	N / A

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

7.1 General objective	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	1. Solve of practical problems using general knowledge of multimedia techniques. 2. 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,	
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.	exemplification, problem presentation, teaching exercise, case study, formative evaluation	**Use of .ppt presentation, projector, blackboard**

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 -2015 (Didatec project)
2. Radu Arsinte – http:/bavaria.utcluj.ro/~arsinte/TDAV

Additional:
1. Udo Zolzer, Digital Audio Signal Processing, Second Edition, John Wiley and Sons, 2008

8.2 Laboratory	Teaching methods	Notes
1. Audacity audio processing environment. Audio acquisition and conversion using Audacity. 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 **8.3. Project** 1. Overview of projects. Planning. 2. Acquisition and pre-processing audio information using Audacity	Didactic and experimental proof, didactic exercise, team work	Use of laboratory instrumentation, experimental boards, computers, multimedia board

3. Acquisition of information from sources video SVC (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		

References (Textbooks, courses, laboratory manual, exercise book)

1. 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

4. Radu Arsinte – http:/users.utcluj.ro/~arsinte/TDAV

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. Evaluation

Activity type	10.1 Assessment criteria	10.2 Assessment methods	10.3 Weight in the final grade
10.4 Course	The level of acquired theoretical knowledge and practical skills	*Written test(theory and problems)*	*T 50%*
10.5 Seminar/ Laboratory	The level of acquired knowledge and abilities	*Laboratory tests/ Project evaluation*	*L 25%* *P 25%*

10.6 Minimum standard of performance

Qualitative level:

Minimal knowledge:

- ✓ *To evaluate the amount of information in audio/ video acquisition*
- ✓ *To know basic equipment used in audio- video processing*
- ✓ *Use of basic methods (and physical supports) to store audio-video information*

Minimal competencies:

- ✓ *To operate audio-video equipment and connection to the computerized instruments*
- ✓ *Use of computer equipment and specialized software to process audio-video files*

Quantitative level:

- ✓ *Attendance of all laboratory and project sessions*
- ✓ *Evaluation in exam (T) and practical activities ((L+P)/2) at least 4.5 points/out of 10.*
- ✓ *Final grade is computed with the formula: 0,5*T+0,25*L+0.25*P*

Date of filling in:	Responsible	Title First name SURNAME	Signature
20.06.2023	Course	Assist. Prof. Camelia FLOREA, Ph.D.	
	Applications	Assist. Prof. Camelia FLOREA, Ph.D.	

Date of approval in the Council of the Communications Department 11.07.2023	Head of Communications Department Prof. Virgil DOBROTA, Ph.D.
Date of approval in the Council of the Faculty of Electronics, Telecommunications and Information Technology 12.07.2023	Dean Prof. Ovidiu POP, Ph.D.