MINISTRY OF NATIONAL EDUCATION

TECHNICAL UNIVERSITY
OF CLUJ-NAPOCA

SYLLABUS

1. Study Program

1.1	Higher Education Institute	Technical University of Cluj-Napoca
1.2	Faculty	Electronics, Telecommunications and Information Technology
1.3	Department	Communications
1.4	Study domain	Electronics and Telecommunications Engineering
1.5	Study level	Master
1.6	Study program/ Qualification	Multimedia Technologies/ Telecommunications/ Master
1.7	Type of education	IF (Full-time learning)
1.8	Discipline code	TM-E11.40/ TC-E10.00

2. Discipline

2.1	Discipline name					Audio-Video and Data Transmission					
2.2	Subject area					Electronics and Telecommunications Engineering					
2.3	Responsible					Professor Radu Arsinte , Ph.D. Radu.Arsinte@com.utcluj.ro					
2.4	Titular					Professor Radu Arsinte, Ph.D.					
2.5	Year of study	I	2.6	Semester	2	2.7	Evaluation	Exam	2.8	Type of discipline	DS/DO

3. Total estimated time

Year/ Sem	Discipline name	No. of weeks	Course	Applications			Course	Applications			Indiv. study	TOTAL	ECTS
			[hours/week]				[hours/week]						
			C	S	L	P		S	L	P			
II/3	Audio-video Data Transmission	14	2	0	1	0	28	0	14	0	58	100	4

3.1	Number of hours per week	4	3.2	course	2	3.3	applications	1
3.4	Total hours per curriculum	56	3.5	course	28	3.6	applications	14
Individual study								Hours
Study based on manuals, course materials, references and notes								14
Supplementary documentation in libraries, electronic platforms and on field								10
Preparation of seminars/laboratories, homeworks, essays, portfolios								10
Tutorial work								7
Assesments								3
Other activities								14

3.7	Total hours of individual study	58
3.8	Total hours per semester	100
3.9	ECTS	4

4. Prerequisites (if necessary)

4.1	Curriculum	Basic Electronics and/or Telecommunications courses
4.2	Competences	Use of equipment and software for telecommunications

1. Requisites (if necessary)

5.1	Course	Video-projector, screen, whiteboard
5.2	Applications	PCs with Internet access

6 Specific competences acquired

Professional competences	Theoretical knowledge (What do the student should know)	The students will know: Audio-video data acquisition. Overvi\ew of audio-video compression. Transmission on terrestrial channels. Analysis of the link. DVB-T-Overvew. Features of communications cables. The analysis of signal to noise ratio on different channels. DVB-C audio-video and data transmission. DOCSIS standards. Satellite link characteristics. Link budget. Access techniques in satellite links. Transmission of audio, video and satellite data. DVB-S. VSAT systems. The hardware structure and software communication equipment for the mentioned environments. IPTV basics. Applied technologies in IPTV.
	Acquired skills (What the student is able to do)	The students will be able to: Evaluate informational aspects of audio-visual information; Evaluate the specific methods in transmission of audio-video information; Use of simulation tools (Matlab) to assess communications link with terrestrial / cable / satellite; Install the equipment for transmission and reception, Use interfaces and software; Apply signal processing methods in DVB-S/DVB-C/DVB-T using computers and embedded systems; Establish the structure of the functional blocks of individual and collective receiving equipment for data and TV via cable, satellite, terrestrial; Functional evaluation and installation of professional equipment based on use and service manual; Install and integrate special media equipment in systems with complex functionality
	Acquired abilities (what equipment/ instruments/ softwares the student is able to handle)	The students will be able to use: Spectrum analyzer for signal evaluation or link quality Headend equipment type (CATV); cable modem; Satellite communication equipment Software simulation for link design an analysis in terestrial, cable and satellite comms. Virtual equipments based on PC and application specific boards.
Transversal competences		CT3 Adapting to new technologies, professional and personal development through continuing education using electronic documentation and printed sources, in Romanian and in at least one international language (English). Competencies for analysis and synthesis and optimization systems thinking. Flexibility in thinking and ability to work with interdisciplinary concepts and tools.

7 Discipline objectives (based on the grid of specific competences acquired)

7.1	General objective	
7.2	Specific objectives	

8. Contents

8.1. Course (titles)		Teaching methods	Obser-vations
1	Informational aspects of audio-video data	Presentation, discussions	Videoprojector
2	Coding for data storage and audio-video transmission		
3	Audio and video data using terrestrial links. DVB-T standard.		
4	Second generation in terrestrial digital broadcast. Other TD terrestrial standards. DVB-H.		
5	Cable link. Features. Performance analysis of the environment		
6	Transmission of information in analogue and digital cable (DVB-C). Community TV distribution systems		
7	Data transmission using coaxial cable. Standards: DOCSIS, EuroDOCSIS		
8	Satellite link. Features. Link budget.		
9	Access techniques in satellite communications: FDMA, TDMA, CDMA.		
10	Audio and video via satellite. Standards DVB-S, DVB-S2.		
11	Data transmission and satellite phone. VSAT Systems		

12	Audio / video distribution of using Internet protocol (IPTV)		
13	Indoor (In-home) multimedia networks		
14	Review the key concepts of the course. Presentation of examination subjects		
8.2. Applications (laboratory work)		Teaching methods	Obser-vations
1	Distribution of homework projects	Simulations, experiments	PC, simulator
2	Analysis of DVB transport streams online and on simulator		
3	Analysis of DVB-T Signal Processing chain using Matlab		
4	Analysis of the signal processing chain in DVB-C using Matlab		
5	Study of the decoding system and combined TV distribution (Headend)		
6	Hard and soft structure of cable equipment (DOCSIS modems)		
7	Satellite transmission systems. Telecom satellites: types, orbits		
8	Configuration of satellite equipment. Services (DTH and VSAT)		
9	Design of satellite communication links, part 1 (balance link)		
10	Design of satellite communication links-Part 2 (services)		
11	Design of satellite communication links-Part 3 (report)		
12	Complex data distribution (audio / video, data) in residential areas		
13	Distribution of audio - video using IP protocol - IPTV		
14	Lab test. Analysis of projects		

References:

1. Walter Fischer, Digital Video and Audio Broadcasting Technology, A Practical Engineering Guide, Third Edition, Springer, 2010
2. Wes Simpson and Howard Greenfield, IPTV and Internet Video (Second Edition), Taylor & Francis, 2012
3. Gerard Maral, Michel Bousquet, Zhili Sun, Satellite Communications Systems: Systems, Techniques and Technology, 5th Edition, 2009
4. David Large, James Farmer, Broadband Cable Access Networks: The HFC Plant, Morgan Kaufmann , 2009

Other information: Radu Arsinte – course site: http://users.utcluj.ro/~arsinte/

9. Discipline content corroborated with the expectations of the epistemic community representatives, associations, professional and related program employers

Acquired skills will be needed in the following possible COR occupations: electronics engineer, telecommunications engineer, system and computer design engineer, or new occupations proposed to be included in COR (sales support engineer, developer of multimedia applications, network operating engineer, test engineer, project manager, traffic engineer, communications system consultant.

10. Assessment

Type of activity	10.1	Evaluation criteria	10.2	Evaluation method	10.3	The weight of the final grade
Course		Written test with 9 questions (T = 1...10) Scientific papers (S = 1…10)		Written test (T=50%) + activity during the semester (S=50%) E = T + S		E = 50%
Applications		Project developed during the semester in the laboratory (P = 0 ... 10)		Project defended at the end of semester		P = 50%
10.4 Minimum performance standard						
The final grade (N) is calculated as average of marks obtained in the evaluation of ongoing activities and application type: N = (E + P) / 2. The condition for obtaining the ECTS credits is that both components of the final grade to be higher than or equal to 5 (five).						

Date
24.06.2020

Titular
Professor
Radu Arsinte, Ph.D.

Responsible
Professor
Radu Arsinte, Ph.D.

Date of approval

Head of Departament
Professor Virgil Dobrota, Ph.D.