

COURSE DESCRIPTION

1. Program identification information

1.1 Higher education institution	Politehnica University of Bucharest
1.2 Faculty	Faculty of Electronics, Telecommunications and Information Technology
1.3 Department	Department of Applied Electronics and Information Engineering
1.4 Domain of studies	Electronic Engineering, Telecommunications and Informational Technologies
1.5 Cycle of studies	Licence
1.6 Program of studies/Qualification	Technologies and Systems of Telecommunications (TSTeng)

2. Course identification information

2.1 Name of the course				Television			
2.2 Lecturer				Conf. Dr. Ing. Ioan TACHE			
2.3 Instructor for practical activities				As. Drd. Ing. Constantin BURLACU			
2.4 Year of studies	III	2.5 Semester	6	2.6 Evaluation type	Verification	2.7 Course choice type	Optional

3. Total estimated time (hours per semester for academic activities)

3.1 Number of hours per week, out of which	3	3.2 course	2	3.3 practical activities	1
3.4 Total hours in the curricula, out of which	42	3.5 course	28	3.6 practical activities	14
Distribution of time					hours
Study according to the manual, course support, bibliography and hand notes					23
Supplemental documentation (library, electronic access resources, in the field, etc)					3
Preparation for practical activities, homeworks, essays, portfolios, etc.					5
Tutoring					0
Examinations					5
Other activities					0
3.7 Total hours of individual study					36
3.9 Total hours per semester					78
3.10 Number of ECTS credit points					3

4. Prerequisites (if applicable)

4.1 curricular	Signals and Systems, Integrated Digital Circuits, Fundamental Electronic Circuits
4.2 competence-based	Basic knowledge about analog and digital signals and circuits

5. Requisites (if applicable)

5.1 for running the course	Not applicable, according to current PUB regulations.
5.2 for running of the applications	Compulsory presence at laboratory classes, according to current PUB regulations.

6. Specific competences

Professional competences	Using the fundamental elements regarding devices, circuits and electronic instrumentation. The application, in typical situations, the basic methods of acquisition and signal processing.
Transversal competences	-

7. Course objectives (as implied by the grid of specific competences)

7.1 General objective of the course	The course familiarizes the students with analogue and digital television systems and with video signal processing equipment. The concepts of visual perception and colorimetry are presented. Design and parameters for image acquisition sensors and image display devices and television receivers are studied. Also, the equipments for digital television studios are studied.
7.2 Specific objectives	Applications familiarize students with video signals, digital television receivers and digital television studios equipment. We study in particular: The way of formation of image signals, the analysis and measurement of these signal parameters; Construction of digital terrestrial television receivers, cable and satellite receivers, measurement of these receiver parameters; Equipment used in digital TV studios, measuring of such equipment performance; Video quality measurement in digital television systems

8. Content

8.1 Lectures	Teaching techniques	Remarks
Characteristics of visual perception. Colorimetry. Colorimetric systems.	Teaching is based on exposure using the video projector (covering communication and demonstration function). Oral communication method used is the expository method. Course materials are lecture notes and presentations. All materials are available in electronic format on the course website.	2 hours
Colour television systems. Image decomposition and video signal formation. TV signal spectrum.		3 hours
Digital television systems. Analog to digital video signal conversion. Digital television standard for studio. Bit rate reduction techniques for digital video signals. Systems and standards for digital video signal transmission.		4 hours

Digital HDTV systems (HDTV and UHD TV). Three-dimensional television systems (3DTV).		2 hours
Image sensors and image display devices. CCD and CMOS image sensors. Liquid crystal display devices (LCD). Plasma display devices. LED display devices. Video projectors. Image sensors and display devices for three-dimensional television (3DTV).		2 hours
Digital television broadcasting. Terrestrial television broadcasting (DVB-T, DVB-T2, DVB-H standards). Cable television broadcasting (DVB-C, DVB-C2 standards). Satellite television broadcasting (DVB-S, DVB-S2 standards). Streaming TV and IPTV systems. Interactive television systems.		4 hours
Digital television receiver. Terrestrial and Cable TV receiver. Satellite television receiver equipment.		4 hours
Television studio equipment. Video mixers. Special effects generators. Sync-generators. Videocameras. Video signal recording devices. Video editing equipment. Equipment interconnection in TV studios.		4 hours
Video surveillance systems		1 hour
Video quality measurement in digital television systems		2 hours
<p>Bibliography:</p> <ol style="list-style-type: none"> 1) S. Naicu, I. Tache - Receptoare moderne pentru TV în culori - Editura All Educational 1998, ISBN 973-9392-58-x. 2) C. Miroiu, N. Drăgulănescu, I. Tache - Recepția emisiunilor TV transmise prin satelit, Editura Tehnică, București 1993, ISBN 973-31-0428-0 3) Site-ul cursului: http://imag.pub.ro/TV/ 4) I. Voicu – Transmisia fluxului de date video – Editura Medro, București, 2007, ISBN 978-973-8487-24-2 5) D. Popa - Noțiuni de Televiziune - Editura Nautica, Constanța, 2009, ISBN 978-606-8105-05-5 6) Ulrich Reimers – DVB The Family of International Standards for Digital Video Broadcasting, Second Edition, Springer Verlag 2013, ISBN 978-3-642-07807-1, 978-3-662-11577-0 (eBook) 7) Gerard O’Driscoll - Next generation IPTV services and technologies, John Wiley & Sons, Inc. 2008, ISBN 978-0-470-16372-6 		

8) L. Margărit, R. Zaciu, - Sisteme de Televiziune -Teorie și aplicații, Ed. Matrixrom, București 1996, ISBN 973-9254-01-2		
9) Gerald W. Collins - Fundamentals of Digital Television Transmission, John Wiley & Sons, Inc. 2001, ISBNs: 0-471-39199-9 (Hardback); 0-471-21376-4 (Electronic)		
8.2 Practical applications	Teaching techniques	Remarks
Video signal generation	Teaching is based on the use of video distribution system in the lab (covering communication and demonstration function). Oral communication method used is problem-method. Students independently test and evaluate the problems by using the equipment for the generation and measurement of digital television signals. The teaching materials are included in the tutorial lab platforms and on the course website.	2 hours
Video signals in digital color systems		2 hours
Digital Television Receiver		2 hours
Satellite digital television receiving equipment		2 hours
Video quality measurement in digital television systems		2 hours
Digital HDTV studio		2 hours
Final lab examination		2 hours
Bibliography: 1) C. Șerbu, L. Margărit, V. Dogaru, I. Tache, D. Petrescu, D. Comănicu - Televiziune - Îndrumar de laborator - Ed. Matrixrom, București, 1995, ISBN 973-97004-0-3. 2) L. Margărit, R. Zaciu, - Sisteme de Televiziune -Teorie și aplicații, Ed. Matrixrom, București, 1996, ISBN 973-9254-01-2 3) Course and laboratory website: http://imag.pub.ro/TV/ 4) Ulrich Reimers – DVB The Family of International Standards for Digital Video Broadcasting, Second Edition, Springer Verlag 2013, ISBN 978-3-642-07807-1, 978-3-662-11577-0 (eBook)		

9. Bridging the course content with the expectations of the epistemic community representatives, professional associations and employers representatives for the domain of the program

Television is an area of extremely rapid development in recent years. Widespread introduction of digital terrestrial television, digital cable and satellite television, IPTV systems, the development of high definition television HDTV, 3DTV three-dimensional television systems and systems for ultra high definition television UHD TV, led to rapid developments with regard to television receivers and studio equipment. ICs industry, the image sensors and image display devices industry, the equipment industry for television, the television studios, the terrestrial television broadcasters, the cable and satellite television broadcasters, the video surveillance industry, have an increasing demand for qualified engineers specializing in systems and digital television receivers and studio equipment.

The course syllabus specifically meets these requirements of current development of television in European and global framework in Electronics and Telecommunications Engineering. The concerned domains cover a wide spectrum: integrated circuit industry, image sensors and display devices industry, the digital television studio equipment industry, the industry of digital television receivers and digital television transmission equipment, TV studios, the digital terrestrial television broadcasters, the cable and satellite operators, the IPTV service providers, the video surveillance industry and other areas that use transmission, storing and processing of image signals.

In this way it provides graduates with the appropriate skills and current training needs and with modern technology scientific skills, quality and competitive, that will allow rapid employment after graduation, the course being perfectly framed in Bucharest Polytechnic University policy, both in terms of content and structure, and in terms of skills and international openness for students.

10. Evaluation

Type of activity	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final mark
10.4 Lectures	<ul style="list-style-type: none"> - knowledge of fundamental theoretical concepts; - knowledge of the application of the theory to specific problems 	<p>Written test held during the semester with data scheduled at the beginning of the semester</p> <p>Written final test</p> <p>Topics cover the entire content and realize a synthesis between theoretical presentation and practical problems</p>	<p>30%</p> <p>40%</p>
10.5 Practical applications	<ul style="list-style-type: none"> - knowledge of video signal generation for different television systems - knowledge of construction and operation of the main television equipment (cameras, receivers) - knowledge of digital television receiver parameters measurement methods 	<p>The final lab exam consists of a practical examination. The practical component is verified by a written test with practical problems of laboratory work and by verification of solving of a practical problem (measurement of parameters of video signals or television equipment)</p>	30%
10.6 Minimal performance standard			
<ul style="list-style-type: none"> - Specify the video signal corresponding to a test image (and vice versa) and measuring its parameters for different television systems. - Measurement of basic parameters in digital television systems using specific professional equipment. - Knowledge of techniques for encoding / decoding in order to generate / reconstruct video signal in various standard television systems used worldwide. 			

Date	Lecturer	Instructor for practical activities
19.09.2017	Conf. Dr. Ing. Ioan Tache	As. Drd. Ing. Constantin Burlacu
Date of department approval	<i>Tache Ioan</i>	Director of Department, <i>JB.</i>
26.09.2017		Prof. Dr. Ing. Sever Pașca